

Subterranea

The Magazine for Subterranea Britannica



Subterranea Britannica



August 2018 Issue 48

IN THIS
ISSUE

Budapest Weekend
Thames Tideway cruise

Waddon & Beddington Caves
Cambridge RSG bunker

Subterranea Britannica is a society devoted to the study of man-made and man-used underground structures and the archaeology of the Cold War. The society is open to all and its membership includes all walks of life. Members are invited to contribute to this magazine even if this just means sending very welcome snippets from newspapers and magazines.

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Front cover photo: *Blakeney Hill Stone Quarry, Forest of Dean. NAMHO Conference delegates negotiate the only significant collapse in Old Upper Level, one of four original access routes into the quarry. Opened in around 1890, the quarry produced silver-grey 'ornamental' stone, but was worked out by 1929. Photo Clive Penfold*

Back page upper: *Sub Brit helpers at the Paddock open day at Dollis Hill on 7 June 2018. Katy Bajina PA to the CEO at Network Homes has organised and run the open days since 2006. She retired at the end of 2017 and this was her last visit to the bunker to help with the tours. Maria Michael is seen on the right; Maria will take over organisation of the open days from 22 September. Katy is seen to her left. Photo Bob Templeman*

Back page lower: *Group shot taken from atop the large underground water reservoir in Kőbánya, Budapest. This immense underground network was originally a quarry (Kőbánya translates as 'stone quarry') and extends to over 30 kilometres of tunnels. It was subsequently used as a brewery by the famous Dreher company during which period the reservoir was built in a side-chamber. The inspection steps for accessing the reservoir can be seen to the right. In World War II the tunnels were used as air-raid shelters and as an underground aircraft factory for Messerschmitt Bf 109 fighters. Photo Clive Penfold*

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However the Editor reserves the right not to publish material without giving a reason.

The committee of Subterranea Britannica and the Editor do not necessarily agree with any views expressed and cannot always check the accuracy of any material sent in.

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Chairman's Welcome

Martin Dixon

As I write this, the press is full of the good news surrounding the rescue of the twelve schoolboy footballers and their coach who were trapped deep underground in a limestone system in Thailand. It seems that after they had entered the complex, the water levels rose so they kept advancing further into the system hoping that the water levels would eventually drop. It's always a welcome change to see the media full of a good news story but we shouldn't forget that a Thai Navy diver died in the lead-up to the rescue.

It brings home the potential dangers of some underground space that fascinates all of us in Sub Brit. Of course many sites we visit have comparatively few hazards but others need appropriate planning and preparation before entering. You wouldn't ride a motorbike without a helmet or drive a car without lights at night so why take risks when underground?

We always stress the importance of health and safety to new members and guidance is available on our website. This includes making a risk assessment of a site before entry. At the simplest level this should include a check that everyone who entered has exited safely (see separate article in this edition).

Another aspect of the rescue in Thailand was the role played by experts from around the world. British cave divers were the first to locate the trapped youngsters and played a key part in their subsequent rescue. I know many Sub Brit members are active in cave and mine rescue groups. I applaud those who give up their time and skill

to help others and hope other members will follow in your footsteps.

On the subject of international cooperation, we always find a warm welcome from other enthusiasts when we venture overseas. Our trip to Budapest in May was no exception and many of the visits (again see separate article) would have been impossible without the support of local volunteers. Although the focus is sometimes slightly different, we have strong links with similar groups to Sub Brit across Europe.

One of the international groups is part of the International Union of Speleology – specifically their 'Artificial Cavities' Commission on which I represent the UK. The group holds a joint conference and visits programme every two years, focused exclusively on man-made underground structures.

The next event is in and around Dobrich and Varna in Bulgaria, from 20 – 25 May 2019. More details including registration forms can be found at www.hypogea2019.org

All papers and presentations are made in English so the content is particularly easy to understand. Presentations are limited to 15 minutes so there's little chance of getting bored by a particular topic. Proposed visits include underground cities, churches, monasteries, catacombs and quarries. Attendees are expected to travel from many European countries and so it's a great chance to make contacts and to explore some fascinating sites.

chairman@subbrit.org.uk

*Our chairman eyes up a potential new motor in Budapest. Martin and Beni Burgess tower over Beni's Trabant that provided authentic Cold War transport back to the airport. Nicknames for the Trabi include 'a spark-plug with a roof'!
Photo Linda Dixon*



SUBTERRANEA BRITANNICA DIARY

Summary of Forthcoming Events

Sub Brit specific events

2018

- 22 September Paddock Open Day
- 19 October SB Committee Meeting
- 20 October SB Autumn Meeting, Nottingham
- 21 - 22 October SB Visits Days, Nottingham
- 1 November Copy deadline for *Subterranea* 49
- December *Subterranea* 49 published

2019

- 26 January SB Committee Meeting
- 28 February - 3 March SB Visit to Boulogne
- 27 April SB Spring Meeting & AGM

Other underground-related events

2018

- 11 - 19 August Fortress Study Group/CDSG Swiss Defence Tour
- 31 August - 4 September AIA Conference, Nottingham
- 8 September Reigate Caves Open Day
- 6 - 9 & 13 - 16 September Heritage Open Days, England
- 14 - 16 Bristol Open Doors Days
- 22 - 23 September London Open House
- September (various) Heritage Open Days, Scotland, Wales & N. Ireland
- 27 October Dr Ivor Brown Memorial Lectures, Ironbridge
- 23 - 26 November SFES Congress, Senlis, France

2019

- 13 April SERIAC, Kent
- 20 - 25 May Hypogea, Dobrich, Bulgaria

For web links to these events please visit www.subbrit.org.uk/events
or contact the organisation concerned

*If you know of other relevant events run by other societies, please let us know
so that they can be advertised in the next edition and on the website*



Subterranea Britannica Annual General Meeting 2018

Minutes

14th April 2018, Lecture Theatre 1.31,
Royal School of Mines, Imperial College, London.

The meeting was opened at 10.05 by the Chairman, Martin Dixon, who welcomed all those attending. 90 members were present.

1. Apologies were received from Michael Thompson, Chris Kenney, Phil Perfect, Bob Clary, Charles de Winton, James Buller, Jonathan Maisey, Mike Moore, Stewart Wild.
2. The Minutes of the AGM 2017 were published to all members in *Subterranea* September 2017. It was proposed by Alistair Graham Kerr, seconded by John Burgess, that the Minutes were a true reflection of the meeting; the proposal was accepted unanimously.
3. Annual Report. This has been published to all members and is on the web site. Martin highlighted some of the key activities during 2017 and thanked all members who had contributed, both visibly and behind the scenes. Sub Brit arranged weekends and longer trips based in Copenhagen/Malmo and Portsmouth/IOW, Dover/Northern France and Gibraltar; there were also a good number of day visits including Bristol Clifton Bridge and Rocks Railway, Maidstone and Oxford ROC Controls, Northampton Emergency Planning HQ, Westcott Rocket Propulsion Establishment, Tunnels beneath the Thames and a host of others. This enabled several hundred Sub Brit members to go underground – let alone all the private visits arranged.
4. Statement of Financial Activities: Sub Brit's Accounts have been signed off by the Committee and Independent Examiner and have been filed at Companies House and the Charity Commission.
5. The motion that nominations for Sub Brit's Committee be considered '*en-bloc*' was proposed by Andrew Smith and seconded by John Coates. The motion was carried unanimously.
6. The motion to elect the following Committee members for 2018/19 was proposed by Nigel Wall and seconded by Sam Marko. The motion was carried unanimously.

The elected Committee for 2018/2019 is:-

Martin Dixon	Chairman
Richard West	Vice Chairman
Linda Dixon	Secretary
Nick Catford	Membership Secretary
Tony Radstone	Treasurer
Alistair Graham Kerr	Member
Jason Hughes	Member
Richard Seabrook	Member
Paul Sowan	Member
Bob Templeman	Member
Tim Wellburn	Member
Phil Catling	Member
Chris Gray	Member

The Meeting officially closed at 10.27.

Martin then outlined a number of forthcoming events including the Cambridge War Room, Study Weekend in Budapest, RAF Lakenheath, Paddock special opening, Mail Rail 'behind the scenes' and the Autumn Conference and Visits in Nottingham.



NEWS

Miscellany compiled by Paul Sowan and Nick Catford

NEWS – ARCHAEOLOGY

'Pre-human' cave art reported from La Pasiega, Spain

Improved archaeological dating techniques have reportedly revealed that 'abstract' patterns made on cave walls as La Pasiega in northern Spain are much older than previously believed. Hitherto assumed to be the work of modern man, *Homo sapiens*, this art-work has now been found to be something like 64,000 years old, and therefore made by now extinct Neanderthals long before our modern species arrived in Europe.



While this isn't 'writing' as we know it today, it is possibly a very early attempt at creating a more complex message using multiple signs

Previously dated by the carbon-14 method, the 'sophisticated symbols' have now been examined by the uranium-thorium technique which has resulted in the revised age. They are now regarded as the oldest known cave art.

SOURCE: Von Radowitz, John, 2018, Old masters: cave art was Neanderthal, 20,000 years before humans arrived. *Metro*, 23 February 2018, page 18.

Secret underground church and tunnel system found in Syria

Archaeologists in Syria have discovered the remains of a secret church that may date back to the first centuries of Christianity, hiding in plain sight in a territory held by ISIS for more than two years. It's thought that the ancient tunnel system found in Manbij once served as a refuge for Christians who faced persecution during the Roman Empire. And somehow, the ancient gate leading deep underground appears to have gone unnoticed by the ISIS forces who formerly occupied it.

Beside a mound used to dump rubbish, researchers found the remains of a sprawling tunnel system containing escape routes, hidden doors, Greek inscriptions, and a makeshift altar – with crosses and Christian symbols etched all throughout.



The remarkable underground network was likely a significant haven for Christians in the third or fourth century AD. It even contains a graveyard that was likely used for the church clergy, with human remains found inside large stone tombs. Had ISIS found out about the ruins, which the team first discovered back in 2014, the site likely would have been destroyed.

Archaeologists kept it secret for years before excavations could finally begin in August of 2017, a year after ISIS was driven out of the area. Locals helped to unearth a second component of the tunnel system, with stone steps leading down to a cave filled with rooms and Christian symbols.

Now that ISIS has been driven from the area and work can progress, researchers at the site say they are committed to protecting it.

SOURCE: *MailOnline*, 2 May 2018.

Samuel Taylor Coleridge found in a wine cellar at Highgate Hill, London

The coffin of the poet Samuel Coleridge Taylor, who died in July 1834 aged 61, has been found in one of five lead coffins in a bricked-up wine cellar adjoining the crypt of St Michael's church at Highgate Hill.



The church was built in 1831, in part above a 17th-century wine cellar associated with an earlier building. The cellar appears to have been incorporated in the crypt, but walled off from it.

SOURCE: Kennedy, Maeve, 2018, Remains of the poet Coleridge found laid down in wine cellar. *The Guardian*, 13 April 2018, page 22.



Medieval underground water gate discovered at Rochester Castle

Archaeologists have unearthed a fascinating find dating back to the 14th century while excavating at Rochester Castle. An archway leading to a small chamber with a large shaft above, known as a water gate, has been discovered alongside the wall on the Esplanade.

The fortified gate was probably used to transport goods from the riverside to the castle, according to the Rochester Bridge Trust, which commissioned the dig. In medieval times it would have also been used to allow those within the fort direct access to water transport.

Experts said the materials used to construct the entrance arch were of particular interest. While Kentish ragstone was used, there was also evidence of tufa which has not been quarried since 1150. There was also peg-tile which was used in Rochester around 1200 and a yellow brick from around 1375.



The hole in the front of the gate has now been closed and the footway rebuilt. But the information gathered during the investigation and the scans that were carried out mean it will continue to be studied for some time to come.

Peter Kendall, of Historic England, said: "Laser scanning and data processing can be a great help in understanding the past, especially in such inaccessible places as this where the water gate is buried underground."

Designed to command an important river crossing, the castle was built in stone by Gundulf, Bishop of Rochester, in the 1080s. It endured three sieges, including a famous assault by King John in 1215, when one corner of the keep was destroyed. It became redundant as a royal stronghold in the late Middle Ages and fell into ruin in the 17th century, but remains a potent symbol of medieval secular power.

SOURCE: *KentOnline*, 31 May 2018.

NEWS – CONSERVATION AND HERITAGE

New Kennedy museum may be opened on Nantucket island

Nantucket officials are considering whether to make a museum out of an underground military bunker that was reportedly built to shelter President John F. Kennedy from a nuclear attack.



The Cold War-era fallout shelter is located off Tom Nevers Road on the southeastern side of Nantucket island, Massachusetts. Some locals call it 'the Kennedy bunker,' and the Kennedy connection has been made in past media reports and books. Now there's talk about turning the town-owned bunker, which is usually closed to the public, into an educational exhibit and tourist destination.

SOURCE: *Boston Globe*, 14 May 2018.

Postal Museum shortlisted for £100,000 prize, London

The Postal Museum, opened in summer 2017, is one of five shortlisted for the £100,000 Art Fund Prize as *Museum of the Year* for 2018. The prize is awarded each year to a museum which has shown 'exceptional imagination, innovation and achievement in the preceding year'. The four runners-up will each receive £10,000. Visitors to the museum enjoy a ride through the former Post Office Railway's depot, tunnels and station at Mount Pleasant.

SOURCE: Brown, Mark, 2018, Subterranean train ride puts mail museum on track for £100,000 prize. *The Guardian*, 2 May 2018, page 7.

New Battle of Britain visitor centre opens at former RAF Uxbridge

A state-of-the-art visitor centre which tells the incredible story of top-secret plotting to defeat the German air force in the Battle of Britain opened its doors to the public over the Spring bank holiday weekend. Coinciding with the 100th anniversary of the founding of the Royal Air Force on Easter Sunday, Hillingdon Council's Battle of Britain exhibition and visitor centre in Wren Avenue, Uxbridge, was opened on Friday 30 March.

The museum showcases the original underground Battle of Britain bunker which was the centre of No. 11 Fighter Group operations during the crucial air battle of July to October 1940, and from where aircraft were scrambled to defend London and the southeast of England from Luftwaffe air attacks. It was here that Winston Churchill was thought to have first uttered the legendary phrase: "Never in the history of mankind has so much been owed by so many to so few."





Battle of Britain Ops Room in 1942

Located at the former RAF Uxbridge base which closed in 2010, the visitor centre, funded by the council to the tune of £6m, tells the story of the bunker's crucial role in history for the first time. The reconstructed bunker, 76 steps down from the new museum, features the iconic map table where flightpaths of aircraft could be plotted and attacks charted with counters by a workforce which was 85 percent women. The new displays include full-size replica aircraft, original artefacts, wartime footage and oral histories.

There is also a replica of the original plotting table map as part of a 360-degree touch screen experience, which can be enjoyed by those who cannot take the tour down into the bunker to view the original.

Hillingdon Council took over guardianship of the bunker in 2016 from the Ministry of Defence and secured £1m of government funding to help restore it. Previously tours of the bunker were sporadic, but there are now five each day led by professional guides.

The centre was officially opened on March 16 with a civic ceremony attended by Mr Puddifoot and Uxbridge & South Ruislip MP Boris Johnson, along with RAF and WAAF veterans – some of whom actually served in the bunker during the war.

The bunker forms the centre of the new 40-acre Dowding Park, named after Air Chief Marshal Hugh Dowding who ran Fighter Command during the Battle of Britain and chose RAF Uxbridge to co-ordinate operations. It is surrounded by new homes, a school and new business units as well as the visitor centre, to form a new residential/cultural park.

SOURCE: *Get West London*, 3 April 2018.

NEWS – MILITARY AND DEFENCE

RAF Scampton to close

RAF Scampton is the latest RAF station to face closure as part of the Ministry of Defence's 'A Better Defence Estate' strategy. The station will close by 2022 because the investment needed at the base would be better spent improving the RAF's existing core sites. The paper, originally published in November 2016, stated in many

areas the MoD uses its property efficiently, but "overall it is still too big, too expensive, with too many sites in the wrong locations". The report said the MoD would dispose of 56 sites by 2040.

The government said it would deliver better value for money and release enough land to build 55,000 homes. Though they weren't mentioned in the original paper as being under threat, it appears the MoD has now decided to dispose of both Scampton and Linton on Ouse in North Yorkshire.

Scampton was the home of the US Strategic Air Command B-29 Superfortress bombers between 1948 and 1949, followed by four squadrons of Canberras in 1953. The runway was extended to 10,000ft in 1956 which forced the old A15 to be re-routed, and this is reflected in the station's bow and arrow badge - the bowstring is the road and the arrow is the runway.

1958 saw the return to Scampton of 617 Squadron, which flew Vulcan bombers as part of the UK's nuclear deterrent during the Cold War along with Vulcans from Waddington and Coningsby. Matters came to a head during the Cuban Missile Crisis in October 1962 in the stand-off between America and the Soviet Union over Russia's deployment of ballistic missiles in Cuba - when the world seemed on the brink of nuclear obliteration. The last Vulcan flight from Scampton was in 1982.

The Red Arrows first called Scampton home in 1983. They remained there until 1995 when they relocated to Cranwell. The base was mothballed between 1996 and 2000. The Red Arrows arrived back at Scampton in 2000. It had been due to close in 2014 but two years earlier the MoD confirmed the Red Arrows would remain there until at least 2020. Talks are now underway with the Civil Aviation Authority about moving the training airspace currently above RAF Scampton, which would enable the Red Arrows to move to a suitable alternative location.



Sub Brit's Bob Jenner in the recently opened Control and Reporting Centre at RAF Scampton in 2005

In late July 2004 it was announced that RAF Boulmer would close by 2012, with the majority of its functions transferring to a new Control and Reporting Centre at RAF Scampton. In 2005 Scampton was placed under the



control of RAF Strike Command, becoming home to the UK Air Surveillance and Control System Control and Reporting Centre and Mobile Met Unit. The new digital data-linked Control and Reporting Centre at Scampton was formally opened on 25 January 2006. The new CRC occupied a historic two-storey building, No 119, at right angles to the Station Headquarters. Built in 1936, the building was the airmens' mess; its dining room was used as a briefing room during Dambuster raids during World War 2, and also doubled as the station cinema. It was adapted for its new use in close liaison with English Heritage.

In May 2006 both CRCs shared responsibilities for Control and Reporting but due to perceived difficulties with funding for Scampton, a review was announced into the decision to close Boulmer. On 10 January 2008 the MoD announced that RAF Boulmer would be retained as the core site for the ASACS Hub. It was confirmed that the relocation of the ASACS satellite units to RAF Coningsby was the best option in operational and financial terms. To accommodate this, the CRC at RAF Scampton and No.1 Air Control Centre RAF Kirton-in-Lindsey would co-locate at RAF Coningsby. The relocation was due to be completed by the end of 2014. Boulmer remains open and today it is still home to Air Surveillance and Control System (ASACS). The Control and Reporting Centre at RAF Boulmer uses ground-based military and civilian radars to monitor, detect and identify all aircraft in and around UK airspace - 24/7, 365 days a year.

SOURCE: BBC News 24 July 2018 and Sub Brit web site
South East London Group Control at Pear Tree House to be demolished

The Central Hill Estate in the London Borough of Lambeth is a social housing estate. It comprises more than 450 homes built in 1966–74 near the site of the former Crystal Palace. Lambeth Council plans to demolish the estate so that it can build an extra 400 homes, many for private sale, so that it can finance the construction of new social housing.

Lambeth Council contends that homes suffer from damp and that the design of the estate encourages crime. Residents say that the crime rate is less than average and that problems with the buildings are the result of lack of maintenance by the council.

Architects PRP were appointed to explore redevelopment options for the estate in and on March 24, 2017, Lambeth Council reached a decision to completely demolish the estate.

The estate includes a block of council flats called Pear Tree House which had a two-level bunker in the lower floors. Work on Pear Tree House started in 1963. The new borough control centre was intended to replace the existing borough control in St Matthews Road; Brixton was to become a sub-control. It cost £31,850 of which the Home Office paid 75% (£23,250).



Blast door into the upper floor of the Pear Tree House bunker in 2001. Photo Nick Catford

The 18-room bunker and flats were completed in 1966 and the bunker went into care and maintenance when civil defence was stood down two years later. In 1971 London was designated a civil defence region again and in 1973 the GLC set up emergency planning teams looking at the future structures of civil defence in the capital.

It was decided that London would be split into five groups of boroughs each having its own control centre. The GLC selected the Pear Tree House bunker as the South East group war HQ and although not ideal it was converted in 1979.

This bunker was one of the four London group controls. It replaced an earlier bunker at Kennal Manor, Chislehurst, and covered the South East Group (Bexley, Bromley, Croydon, Greenwich, Lewisham and Southwark).

With the end of the Cold War in 1991, Civil Defence was stood down by the London Fire and Civil Defence Authority (LFCDA) and the bunker was no longer required. Lambeth Council tried to find a new use for it but the bunker has remained empty and largely unused since 1991.

SOURCE: Sub Brit website.

Trump's White House bunker

A new book says the White House has a massive secret bunker beneath its north lawn for doomsday scenarios. The bunker, built during former President Barack Obama's administration, was toured by members of President Trump's staff last year. The facility is large enough to fit the White House workforce indefinitely.



The 'bunker' under the north lawn under construction

A large north-lawn construction project began in 2010, officially to improve White House electrical wiring and air conditioning, although it was long suspected the \$376 million project involved a bunker. The White House already had a bunker, under the East Wing, called the Presidential Emergency Operations Center, where Vice President Dick Cheney and other senior officials hid during the 9/11 terrorist attacks. The new facility is much larger. At least five stories deep, the bunker was completed near the end of Obama's tenure. A spokesperson for the Secret Service declined to comment on the bunker's existence. SOURCE: *Washington Examiner*, 2 April 2018.

Helsinki's bunker city: How Finland has survived in Russia's dark shadow

On the busy streets of Finland's capital, Helsinki, security preparations were underway in mid-July to host the much-anticipated summit between US President Donald Trump and Russian leader Vladimir Putin.

But deep beneath the streets, hewn into the granite, lies a vast network of tunnels and caverns that provide Finland with its last line of civilian defence. In the event of a military attack, officials in Helsinki say the entire population of 640,000 could be sheltered in the solid rock bunkers, equipped with food, bedding, sanitation, hospitals – and even an underground ice hockey rink.

Finland struggled for more than a century to assert its independence from the Kremlin. With its long Russian border and painful history of Russian invasion, Finland has strived to balance the interests of its giant neighbour and its own independence. This means not opposing Russia, but also not being allied to it, a delicate stance known as 'Finlandization.' The term also captures how Finland, now a member of the European Union, remained officially neutral during the Cold War. It's a status that has involved compromises.



Part of the tunnel network under Helsinki

There are no illusions here about what the biggest threat to Finland is. It's still Russia that's a potential enemy. Finland's historical neutrality and its proximity to Russia made it a choice venue for Cold War era summits, characteristics that have once again thrust it into the spotlight. Engage with Moscow, but also prepare for the worst – that's how tiny Finland has survived in the dark shadow of its Russian neighbour.

SOURCE: 8KPAX.com – *Montana's News Leader*, 14 July 2018.

Cold war bunker at Trowbridge, Wiltshire to be demolished

The existence of a secret Cold War control centre beneath a West Wilts District Council building on Bradley Road, Trowbridge, has been confirmed.

The bunker was built in the early 1980s as part of the Thatcher government's initiative where every district authority was instructed to identify land for a headquarters for an emergency committee to retreat to, in the event of a nuclear war. In the event of a nuclear attack it would have housed local officials attempting to react to the aftermath of a nuclear strike.

The bunker was located in the lower ground floor of the former driving test centre in Trowbridge and a dentists' surgery was later constructed directly on top of it. The entrance to the facility is discreetly located in a small red brick building next to the surgery. In recent years the building has fallen into a state of disrepair. The site, which is still owned by Wiltshire Council, is now being redeveloped. The land above the bunker has been approved for 79 new homes and the bunker will be demolished.



The emergency exit

[The site was visited by members of Subterranea Britannica c.2003. The main entrance was down stairs from inside the driving test centre. The test centre had closed by this date and the building was used as a rest room for council staff. There was nobody around so it wasn't possible to get into the bunker. The generator was housed in a small brick surface building.]

SOURCE: *Somerset Live*, 23 May 2018.

Former Hope Cove RGHQ could become a themed hotel

A rare opportunity has arisen to acquire a former military bunker built in the Cold War on the coast of Devon. The Grade II-listed Hope Cove bunker, situated in an Area of Outstanding Natural Beauty in the South Hams district, is on the market for £900,000 for the freehold and, subject to planning, has huge potential to be converted into a uniquely-themed hotel.



Constructed after the Second World War in the event of strikes from the Soviet bloc, the bunker was originally equipped to be part of an elaborate radar system but it never became operational and instead it was actively used as an RAF Fighter Control School in the late 1950s. The building was then converted into a Regional Seat of Government as a bomb-proof hideout for senior staff who would have controlled the southwest of England if a nuclear attack had taken place.

Following the collapse of the Soviet Union and local government reorganisation, staffing levels were reduced and the bunker eventually closed its doors, being sold to private purchasers in the 1990s.



Today, the building provides extensive accommodation across 33,000 sq ft, featuring 56 rooms arranged over two levels, and the total site stretches across four acres. LSH Hotels director Simon Stevens, who is overseeing the sale, said: “This is a rare and fascinating building which needs to be viewed to fully appreciate its potential and exceptional location. In one direction you have sea views, in the other you have the countryside and Dartmoor National Park – it really is uniquely situated. We are expecting significant interest in this sale from a variety of potential purchasers.”

Inside, the bunker is in good condition and it still houses many of the original features and contents, most of which are included within the sale, including a vast air-conditioning plant room and high quality teak flooring. A 150 ft radio transmission mast is also included which produces an annual income of circa £11k.

The current owner bought the bunker in 2014 for a little under £400,000. He had ambitious plans for the site which came to nothing.

[Sub Brit member Bob Clary was camping nearby and went along during one of the viewing days in July. He reports that a little work was done on the building but the owner’s attempt to create a larger entrance consists of no more than a core-drilled hole through the wall halfway along the outer wall of the lower floor. Other than that and the removal of some lightweight stud partitions from the

1980s refit, the building seems much the same as when visited by Sub Brit members in 2014 and 2015.]

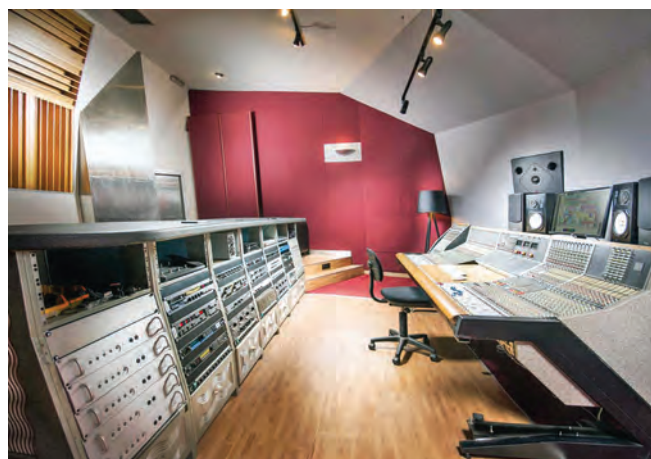
SOURCE: *Boutique Hotelier*, 30 May 2018.

Australian comms bunker converted into a recording studio

An old World War II communications bunker in Camden, New South Wales is probably one of the last places a band would think to record an album. But a recording studio is exactly what Tim Duric has transformed the bunker into.

The studio has seen the likes of bands including The Rubens, These New South Whales, Expatriate and Cloud Control jam and create music there. Mr Duric, who is also a musician, said he decided to turn the bunker into a rehearsal studio because he thought it would be a cool place to write and record music.

The bunker was built during or just after WWII. The Royal Australian Air Force used it as a communications centre. It was then later used as a small-arms firing range. The government sold the bunker to private owners some years later and it was apparently used as a ‘dumping ground’ until Mr Duric renovated the space.



ROC 2 at Wrexham

This is not the first bunker to be converted into a recording studio. In Britain, a recording studio was established by dance music remixers K-Klass in the early 90s at the North Wales ROC Group Control at Borrás, near Wrexham. Since May 2015 it has been operating as ROC2 and is now available for recording/mixing, photography/video production and rehearsals. The studio has already produced remixes for Rihanna.

Another bunker studio has recently opened in Salisbury. Here the Salisbury Urban District Council Control Centre at Harnham has been refurbished as a dedicated youth music studio called The Sound Emporium.

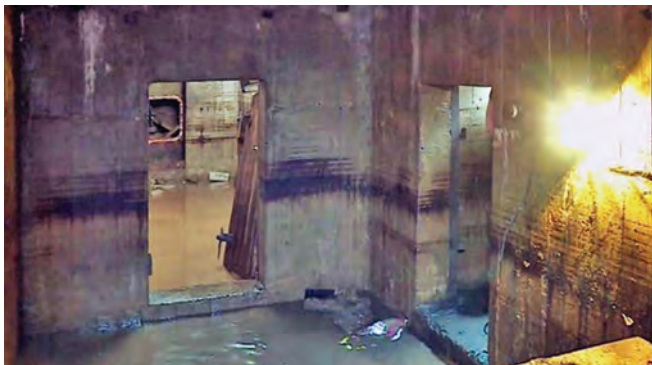
SOURCE: *Camden-Nedrellan Advertiser*, 26 June 2018.

WWII bunker discovered under the back garden of a house in Middlesbrough

Chris Scott was having his home in Marton Avenue; Middlesbrough renovated when he decided to investigate what he thought was a drain cover. “Our neighbours had mentioned something about a bunker, but to be honest we

didn't think any more about it," Mr Scott said. "When my builder suggested having a look at what was under the cover it was opened revealing a 10ft metal ladder leading down to a wooden door."

The bunker was half full of water so they spent two days pumping it out. At the bottom of the ladder was a wooden door which was open and led to the two rooms in solid concrete. The first measures about four metres by three and the second about five metres by three metres. At the end of that room, was another door. After removing rubble from behind the door another ladder was found. This would have been an emergency escape ladder in case the first one was destroyed or blocked by rubble from a bomb. Some of the electrics were still in place as was a wooden table



The bunker was probably built as an air-raid shelter for residents in the street. Chris Scott now plans to turn the bunker into a wine cellar or an office by building concrete steps.

SOURCE: *TeessideLive*, 21 May 2018.

Middlesex County Control to be refurbished as a leisure facility

The former Middlesex County Control Centre is located just inside the grounds of the Roger Bannister Sports Centre in Uxbridge Road, Hatch End. It was built in 1942 and acted as the Middlesex Civil Defence Control Centre throughout the war. The Control was reactivated initially on a temporary basis in 1952.

The original plan was to use the semi-sunken 'shadow' CD centre at Wembley but this was found to be flooded and unusable and has now been demolished. In 1954 there was a proposal to build a replacement semi-sunken control centre alongside in the car park but this plan was scuppered following the 1955 review of controls.

In 1958 it became the Middlesex County Group Control remaining in use until 1965 when Middlesex as a county was abolished and the centre came under the jurisdiction of the London Borough of Harrow. From 1965 to 1968 it was used as the London Borough of Harrow Control Centre, finally closing when the Civil Defence Corps was demolished. It was then handed over to the parks department and has been used as a store by the Roger Bannister Sports Centre.

The building has recently been cleared out and is due to be refurbished as a base for a leisure golf facility planned

for the adjacent grounds. This will include a cafe, flexible rooms for events and for hire and ancillary spaces to support these functions.



The bunker in July 2018. Photo Clive Penfold

If possible anything original relating to the bunker will be retained and, with the help of Sub Brit, an interpretation board will be installed explaining the history of the building. Sub Brit helped with similar boards at the Southall Borough Control, the St Leonards Court air-raid shelter in East Sheen and the Clapham South deep shelter. SOURCE: Sub Brit website.

WWII German bunker in Jersey for sale

Military history fans have a rare chance to buy a German World War II bunker put up by the Nazis in the British Isles. The bunker was built in Jersey while the Germans occupied the Channel Islands and is sited on an area of sand dunes which are up for sale for £200,000.

Hitler fortified the Channel Islands as part of the 'Atlantic Wall' and more than 250 forts were constructed along with bunkers like this one. The bunker is a relic from the five years of Nazi occupation that Jersey endured, with buildings covered in Nazi propaganda during this time.



There are two plots of sand dunes for sale, with the concrete bunker – a listed building – located on the northern site which measures around 11½ vergées, the equivalent of three acres. The land has been owned by the same family since 1909 and is located between Le Braye and El Tico beaches near La Ville des Quennevais. The National Trust for Jersey is interested in owning the bunker site but says it will need help from the States of Jersey if it is to put in a bid.

SOURCE: *MailOnline*, 30 May 2018.



NEWS – MINES AND MINING

Death of David Pollard of the Bath Stone Quarry Museum Trust

We learn with regret that David Pollard died suddenly in 2017. His legacy, the Bath Stone Quarry Museum Trust Ltd, was founded by him some 30 years ago. The Trust, based near Corsham, has advertised for a volunteer to lead on cataloguing and documenting its collection of quarrying equipment, machinery and tools.

In the 1980s he bought Hartham Park Underground Quarry in Corsham. With an encyclopaedic memory he quickly became an expert on the history of Bath Stone quarrying and his dream was well and truly realised when his quarry was brought back into stone production in 1999. It is still working today, operated by Lovell Stone Group and producing large amounts of stone. It is a testimony to his vision and determination.

In the last few years of his life he set about writing a book on Bath Stone Quarrying, finishing it just before going into Hospital. On publication, this will stand as a lasting legacy of his hard work, determination and passion for Bath Stone. It is hoped it will be published before the end of the year.



David was generally acknowledged to be the best authority on the underground building-stone quarries near Bath, and older members of Subterranea Britannica will remember his guided visits underground in the district. David Pollard was a member of Sub Brit until 1996.

SOURCE: Bath Stone Quarry Museum Trust Ltd, 2018, Advertisement. *Industrial Archaeology News* 185, page 24 & Obituary in *Stone Specialist*.

Shaft sinking and tunnelling imminent at the Woodsmith polyhalite mine near Whitby, East Yorkshire

Contracts are now being awarded for the development of a new mine for polyhalite near Whitby, with a view to mining commencing in 2021. The advance work includes shaft-sinking and the driving of a 37-kilometre conveyor tunnel with a diameter of 4.7 metres. This is to run from Wilton on the river Tees to the mine site at Lockwood Beck. The mine is named after geologists Peter Woods and Frederick Smith.

SOURCE: Anon, 2018, Sirius polyhalite mine project moves forward on several fronts. *Down to Earth* 103, 5–6.

Excavations and history at a lead mine at Foolow, Derbyshire

Lead ore was mined at Watergrove mine at Foolow, Derbyshire, from around 1771 to the 1850s. A Newcomen

engine was erected at the site in 1794–1795, and remained in use to 1819. The mine is very well documented in local mining archives, and the excavation of the site is fully recorded in this paper, with numerous plans and photographs. The interpretation of the archive is greatly enhanced by the excavation results, and features excavated are fully interpreted with the assistance of the documentation.

SOURCE: Barnett, John, Nick Willers and Dave Williams, 2018, Watergrove mine, Foolow, Derbyshire: excavating a 1794–95 Newcomen engine house and a history of the mine. *British Mining* 20(2), 1–95.

Thirteenth International Symposium on Archaeological Mining History, Kelmis / La Calamine, Belgium

Institute Europa Subterranea is a largely informal group of mining historians, the leading members of which are mostly from Germany and the Netherlands. A mining history symposium is organised each year, of which your scribe has attended several such as at Freiberg near Dresden in Germany, Jihlava in the Czech Republic, and Valkenburg in the Netherlands.

Papers are all read and discussed in English, and are generally published (also in English) in advance in a handsomely produced and liberally illustrated hardback volume given to those attending. The 2018 Symposium was held at the former zinc-mining village or town Kelmis (La Calamine) near the Dutch and German border in the German-speaking part of eastern Belgium. The place-name reflects the local mineral wealth, calamine being an important zinc ore (zinc carbonate).

About thirty persons, mostly Belgians, Dutch and Germans, but with three or four from Italy and two from the UK, assembled at the Park Hotel in Kelmis on Thursday 10 May for a long weekend of papers and field visits. As is usual, most of the presentations concerned metalliferous mines, with several interesting exceptions.

An especially interesting presentation described the investigation of sulphur mines in Italy, where the toxic mine air (containing hydrogen sulphide and / or sulphur dioxide) makes the use of air bottles and breathing apparatus essential. Investigations of lignite (brown coal) mines also in Italy were the subject of another paper on mining materials other than metallic ores.

Joep Orbons described his work on surveying extensive underground building-stone quarries in the Maastricht region of the southern Netherlands and Luc Stevens introduced his survey of tunnel associated with mottes in France. The object of the mining in this last case was evidently to produce usable underground space rather than useful minerals.

A field walk in and around Kelmis explored the surviving surface remains of relatively modern opencast zinc mining as well viewing adits of underground working. A bonus was provided by the proliferation of less-than-



common wild flowers, especially ‘metallophyte’ species which thrive on heavy-metal-contaminated mine spoil dumps. PWS

Miners trapped after earthquake in Poland

On Wednesday 9 May divers were being sent underground to try to rescue three Polish miners trapped nearly half a mile underground since an earthquake caused a tunnel collapse on Saturday 5 May. The 2.5 – 4 magnitude quake struck the Borynia-Zofiowka-Jastrzebie mine in Southern Poland on Saturday morning trapping seven miners.

Two were found dead and two others have been rescued. It was the largest quake ever recorded to hit the mine. If the divers were unable to reach the miners the Company was planning to drill a new borehole, pump out water and send in divers from the copper and silver mining firm KGHM.

About 250 people were working underground at the time of the quake. The missing miners were in a team drilling a new tunnel. Around 83,000 miners are working in Poland’s coal mines.

SOURCE: *Below* – Journal of the Shropshire Caving & Mining Club, Summer 2018

Visit to the Ardennes ‘Schieferstollen’ (slate mine), Recht, Belgium

This admirably presented tourist attraction, a small slate mine known as Schieferstollen Recht, was visited during the course of the 13th Institute Europea Subterranea mining history conference held at Kelmis in Belgium, 10 – 13 May 2018.

It lies within an attractive forested site on the E42 road on the outskirts of Recht, a village about halfway between Malmedy and St Vith. This was a far smaller operation than the great slate mines of North Wales, and was worked opencast for material for local use from the 18th century onwards, and by tunnelling from 1886.



The conducted tour departs from below the small but smart visitor centre, preceded by a video presentation, the English-language version of which is remarkably well scripted and delivered but is curious in that the translator clearly thought the word ‘arkose’ is in common use in English. It is in fact used almost exclusively by geologists and means a sandstone in which a significant proportion

of the grains are broken feldspar crystals rather than the much commoner quartz. The English-speaking guide also used the word.

The 1½ hour tour proceeds via a display of historic artefacts including worked slates, quarrymen’s tools and the like, and commences underground with a long tunnel into the hillside until the cavern where the required material was reached. Those developing the quarry had hoped for a vein of highly fissile true slate, capable of being split into very thin pieces for roofing. In this they were disappointed, as ‘slates’ no thinner than about a centimetre could be made.

The products would therefore have made for very heavy roofs needing exceptionally strong load-bearing timbers. They therefore resemble the fissile limestones worked at Collyweston (Northamptonshire) and Stonesfield (Oxfordshire), more usually called ‘stone slates’ in English. But at Recht the material is, as in Wales and Cumbria, a true metamorphic rock rather than a sedimentary one.

At the inner end of the long access tunnel visitors ascend to a slightly higher level and examine the chamber from which the slate was worked, where there are displays illustrating quarrying methods and the working environment. This is admirably lit and presented, although the rather noisy light and sound show is utterly irrelevant for the visitor interested in mining! But no doubt it is appreciated by the younger generation... The return to the surface is by way of the long access tunnel already seen on the way in.

The entrance has been re-excavated and the access tunnel made safe for visits, and it is clear that a considerable sum of money has been deployed to that end. For almost the entire underground route, including short flights of steps to and from the upper level, visitors traverse a stainless steel walkway below which mine drainage water flows. This contrasts strongly with what capital investment was put into London’s Chislehurst ‘Caves’.

There are minimal refreshment options back at the visitor centre, and a small range of attractive mineral specimens is offered for sale, but no guide book or postcards. Schieferstollen is at Zum Schieferstollen 31, B-4780 Recht / St Vith, Belgium. PWS

SEE: info@schieferstollen.recht.be / www.schieferstollen-recht.be

Visit to Caestert quarry, Lanaye, Belgium

Many SB members will have been impressed by the extent and the high ceilings of the Box Bath stone quarries, lying above and either side of Brunel’s Box railway tunnel on the London Paddington to Bristol main line. That labyrinth is of modern date, having been developed following the completion of the railway in or about 1840.

Caestert quarry is arguably rather more impressive, with medieval graffiti on the walls and floor to ceiling heights



of ten or more metres. It was visited during the course of the Institute Europa Subterranea conference held at Kelmis in Belgium, 10 to 13 May 2018.

The quarry tunnels are driven in the Maastricht Limestone, a sandy-textured slightly yellow geological equivalent of the English White Chalk. A ridge of this limestone runs southwards from Maastricht in the Netherlands alongside the west bank of the river Maas, past a large opencast limestone excavation and cement factory and across the international border into Belgium.



The whole ridge had been exploited by underground quarrying by the time the border with the newly established Belgium was agreed in 1839, with the consequence that in places in this district it is possible to walk from one country to the other underground. SB members may remember doing that some years back in another nearby quarry entered from the banks of the Albert Canal.

At Caestert a wall has been erected, and in places broken through, to indicate the Dutch border and, more practically, to attempt to prevent access to a dangerously collapsed area where the quarry tunnels have failed under the weight of a very large cement works spoil tip.

There is, regrettably, unrestricted access to Caestert, just a hole in a bricked-up entrance, although it would take some searching for. Fortunately, vandalism underground is not as extreme as might be the case for a more readily located site, although there has been some deliberate interference with some of the centuries-old graffiti. There seems to be no official protection for this magnificent site, which may in part be a result of the Flemish/Walloon border passing through it. Getting two sets of officials talking to each other may be a problem. PWS

NEWS – MISCELLANEOUS

Art exhibition in the Clapham Common deep shelter
Following his six month residency at Growing Underground, a farm 33 metres underground in the Clapham Common deep shelter in south London, Llew Watkins has presented five sculptures in one of the unused

tunnels in the shelter. This gave members of the public an opportunity both to see Watkins' work as well as part of the WWII deep shelter.

Since May 2016, Watkins has been developing *Dressing up Bars*, a speculative fiction narrative that presents the sprawling cultures of the Hemmed City, and a number of other intensely real but absent environments, as seen through the lens of his protagonist Emily. For *Red Thread* he presented five sculptures that explore in abstract form the landscapes of *Dressing up Bars* and the way they intersect with nine personas in his story.



Llew Watkins sculptures in the tunnel

Using materials he was able to source freely in London – including papier-mâché, pigment and sand from the Thames – Watkins spent months creating delicate sculptures that are installed only for a few days before being dismantled.

The exhibition took the form of a free guided tour. Meeting above ground at the Growing Underground offices, Watkins leads tours to the tunnel where the sculptures were installed and gives a short introduction to each in turn before allowing time for visitors to view the works on their own. Finally there was a quick viewing of the studio he has been using since December and a chance to ask any questions.

Because of the nature of the space they only allowed six small groups down into the tunnels to see the work over a weekend in mid-June.

SOURCE: *Ian Visits* website, 18 May 2018.

Indian Railways construct a pedestrian subway in just four-and-a-half-hours

In 2017 a limited height subway was authorised at the site of a dangerous four-track manned level crossing between Kottavalasa and Pendurthi. The subway is made of 20



pre-cast segments of 1.5m width while the size of the box is 4.65m x 3.65m. Indian Railways used 16 heavy duty excavators, 3 heavy duty cranes, 5 tipper trucks, 1,000 sand bags, four hydra machines, heavy weight jacks and a workforce of 300 for the project.

The limited height subway, which was constructed in early 2018, has created a record. Now, that the subway has been opened, the manned level crossing has been closed, reducing the chance of accidents.

SOURCE: *India Today* 5 July 2018.

Southgate tube station briefly renamed Gareth Southgate station

Southgate station on London's Piccadilly line was temporarily renamed Gareth Southgate on 16 July after he led England to their best World Cup performance since 1990. The England manager's forename was added to signage on the platforms, in the ticket hall and outside the Grade II-listed Southgate station, in Enfield, north London. It remained Gareth Southgate station for 48 hours. Two stations on the Paris Metro were also temporarily renamed to honour the heroes of France's World Cup win in Russia.

SOURCE: *The Guardian*, 16 July 2018.



A 1920s-themed cocktail bar in a former underground toilet block in Canterbury

The roaring 1920s have made a much needed comeback in Canterbury, but perhaps not exactly where you would expect. The owners behind *The Loft Bar* in St Margaret's Street had planned to open an underground cocktail bar cleverly called *Privy* in a disused block of toilets on the corner of Burgate and Lower Bridge Street at Christmas but the project overran due to construction issues.

According to their Facebook page, *Privy* is aiming to bring 'glamour, elegance, decadence and a touch of class' to Canterbury's already exciting nightlife scene. The owners say the bar, situated next to the city wall, has a 'saucy speakeasy theme' and will be one of the city's hidden gems, where the essence of the 1920s will live on. There will be jazz at the bar and a saxophonist will play in the corner in the evenings - with burlesque on some nights.



Loft Bar owner Angela Long snapped up the unique site for £198,000 at auction in 2015 when it was put under the hammer by the city council with a guide price of just £55,000. The subterranean toilets opened in the 1930s on the site of a former brewery cellar, and enjoyed a 70-year run before they were closed in 2000 after funding cutbacks from the local authority.

The underground toilets, most recognisable for their iron entrances at the steps which lead to the men's and women's sections, are within a conservation area. The news of the opening comes after another block of toilets in Canterbury were sold for £120,000 at auction late last year, almost £100,000 above the guide price.

SOURCE: *KentLive*, 4 January & 19 July 2018.

Victorian site hut revealed under Lime Street station

A little piece of history was exposed by Network Rail in July when engineers allowed filming access to an underground site hut used by track workers in olden times. The hut, deep in the tunnels under Liverpool's Lime Street station, was built more than 100 years ago by track workers to take their tea breaks. There is a fireplace, and an old kettle, cup and tongs are still in place, preserved in time. It can only be accessed when trains are not running, so with platform and signalling upgrade works coming up at the station in June and July, there was the opportunity to show it off.



Network Rail project manager Graeme Whitehead said: "In years gone by track maintenance gangs would have come here. They'd have had their lunch, a cup of coffee, lit the fire, and waited in between trains. We have no plans to do anything with it, it will stay here. It's protected beneath the tunnels and will remain locked in history for evermore."

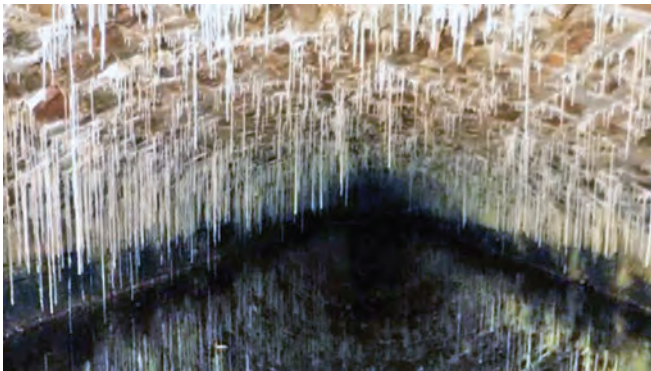
SOURCE: *The Construction Index*, 12 July 2018.



Lost underground reservoir by Isambard Kingdom Brunel scuppers long-awaited road widening scheme

Funding for the work in Starcross, Devon, was allocated in April 2018, but work has been suspended with the discovery of a ‘nationally significant’ underground reservoir. It was part of Brunel’s ill-fated ‘atmospheric railway’, which used a vacuum system to move trains. Structural assessments are under way and archaeologists are being consulted.

Although considered a genius with his work on the Clifton suspension bridge, Great Western Railway and SS *Great Britain*, Brunel failed with his atmospheric railway. It moved the trains by extracting air from pipes laid between the rails, using pumping stations along the track. The pumping stations used water from the underground reservoir to create steam. The system proved more expensive than using conventional steam power and operated for less than a year.



The discovery was made by the Environment Agency, which has been carrying out tidal defence work in the area. Devon county councillor Alan Connett said: “There have been some significant developments that are likely to prevent any improvement scheme in Starcross. As the chamber lies beneath the area where the road widening was to take place, the council will no longer pursue the scheme,” said Mr Connett.

The Environment Agency confirmed that work had been suspended due to the ‘historically important’ discovery, with archaeological surveys identifying two chambers 105ft in length joined by 10 underground arches.

SOURCE: *BBC News – Devon*, 13 May 2018.

London’s buried rivers could be used to heat the capital

A network of lost rivers such as the Fleet and Tyburn buried under the streets of London could provide the capital city with fossil fuel-free heat, campaigners have claimed. These ancient waterways could be directed through heat pumps to provide clean energy – reducing the emissions from the city, according to a new report. However, these pumps have never been used at scale in a UK project and the study did not look at whether building them would be financially viable.

‘In centuries past, a myriad of tributaries flowed right

through London into the River Thames and River Lea,’ researchers from the London-based climate charity 10:10 and social enterprise *Scene* wrote in a new report called ‘Heat seeking in London’s lost rivers’.

They provided water for drinking and cooking, spots for fishing, opportunities for transportation and power for driving mills. However, over the years, many of these ancient rivers were buried by man-made channels to allow the city to expand overhead. Heat pumps are cheaper to run than gas boilers and could provide electricity which is several times more efficient than traditional electric heaters.



The River Fleet

According to the proposal by climate charity 10:10, a sealed tube would bridge between the building that needed heating and the underground river. A refrigerant would be passed along the portion of the sealed tube submerged in the river, pulling in energy from its surroundings. Once the gas has pulled in all the energy it needs from its surroundings, it is forced through a compressor – which dramatically increases the pressure – and pushed into the portion of the heat pump underneath the building to warm.

SOURCE: *MailOnline*, 9 July 2018.

Part of London’s Kingsway tram tunnel opens as a new cabaret venue

The south end of the old Kingsway tram tunnel has opened as a new cabaret venue known as *Proud Embankment*. The club is located immediately below Waterloo Bridge and comprises a two-storied venue with a dining capacity of 450, making it the largest cabaret restaurant of its kind, homing a spectacular array of conceptual shows – from circus and classic burlesque to sleek choreographed routines. After hours the venue will transform into a 750-capacity nightclub open until 5am if you choose.

The founder of the Proud Group, Alex Proud established his first nightclub and art gallery in the Stables Market in Camden in 2001. It hosted stars such as Amy Winehouse and Florence & the Machine and Ed Sheeran is said to have played his first live gig there. It was relocated to the market’s former horse hospital in 2008 but closed in March 2018.



The tram tunnel opened on 24 February 1906. In 1937, the rebuilding of Waterloo Bridge necessitated the diversion of the subway exit to a position centrally beneath the new bridge, the location of the new night club. The tram tunnel closed on 5 July 1952 when London's tram services were withdrawn.

In 1953, London Transport used the subway to store 120 withdrawn buses and coaches in case they were needed for the Coronation. In October 1957 the tunnel was leased to S. G. Young & Co. of Blackfriars as a store for machine parts.



The south end of the Kingsway tram tunnel below Waterloo Bridge

The south end of the tunnel opened as the Strand Underpass on 21 January 1964 but as the underpass was a continuation of Waterloo Bridge the tunnel entrance under the bridge was not required for the underpass and was used as a permanent way maintenance depot by Westminster Council. From 1974 the north end of the tunnel housed the GLC flood control centre in a portakabin located at Holborn tram station.

SOURCE: *ES Magazine*, July 2018 and Sub Brit website.

Luke Skywalker's underground house faces an uncertain future

The Berber underground homes of Matmata lie in an arid, pockmarked landscape in the parched valleys of southern Tunisia's Djebel Dahar region. Made famous by *Star Wars*, these traditional structures are now threatened as residents move away to live in towns and villages.

Every *Star Wars* fan worth their salt knows a little about the location of Luke Skywalker's house: not Tatooine, but the actual filming location in Tunisia. Or, to be more precise, the Hotel Sidi Driss in Matmata, chosen as the set for Luke's family home thanks to its otherworldly underground construction.

But the Hotel Sidi Driss isn't the only underground building of its type. Similar structures dot the landscape around Matmata, a pitted land of palm trees and olive groves. It's an open question as to when nomadic tribes decided to settle here in their underground houses, and the entire area was largely unknown to the outside world until the 1960s, when severe flooding brought it to the attention of the Tunisian government.



Hotel Sidi Driss, used as Luke Skywalker's house in Star Wars

The houses themselves are built by first digging a deep circular pit into the sandstone, which is soft enough to work with simple hand tools. Caves are then dug out around the edges of the pit, forming the underground rooms and leaving the main pit as a courtyard.

Once finished, the troglodyte construction offers a fine escape from the heat of the day, and a sturdy home that could survive for many years. Unless, of course, heavy rains like those of the 1960s lead to flooding, damage and in some cases the destruction of the underground dwellings. Periods of extreme drought can also damage the homes.

Since the last major flooding, and despite the tourism generated by *Star Wars*, another threat to the homes has arisen: rural depopulation. Locals had already begun moving out of their traditional homes during the 1960s and 1970s, when President Habib Bourguiba was trying to modernize the country and many Berbers moved to the towns.

More have since left, slowly trickling away with the decline of tourism. Tunisia's tourism industry has been struggling ever since the country's 2011 Arab Spring uprising, and was further damaged following the 2015 attacks in Tunis and Sousse, which directly targeted tourists.

Some locals have remained, however, living with their families in their underground households, working their olive farms and occasionally accepting tips from tourists who want a tour of their home. And today, only a handful of men still know how to dig and maintain these special Berber dwellings.

SOURCE: *Atlas Obscura*, July 2018.

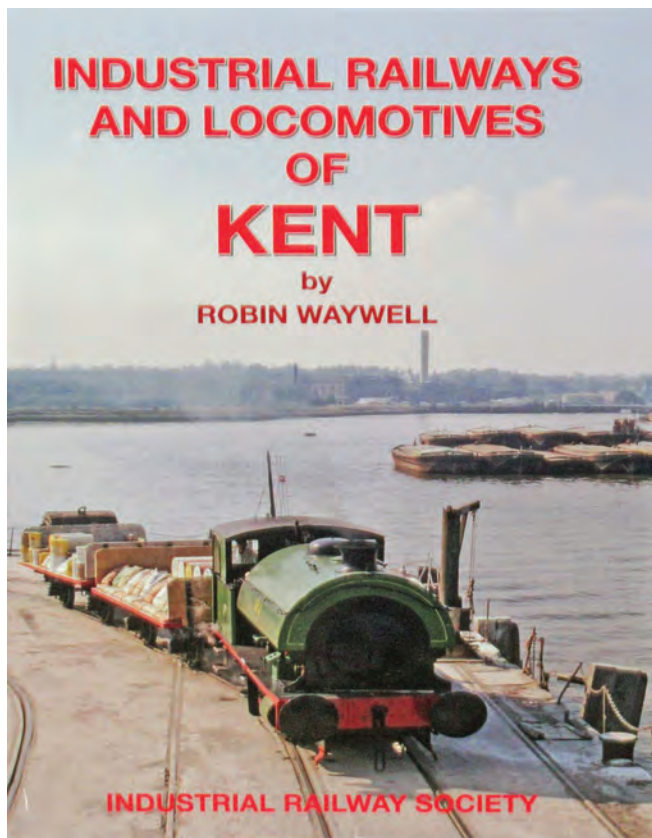
NEWS – PUBLICATIONS

Industrial railways and locomotives of Kent

DETAILS: WAYWELL, Robin, 2016, *Industrial railways and locomotives of Kent*. Melton Mowbray: Industrial Railway Society: 458pp [ISBN 9781-901556-92-6] £35.

Kent, the 'Garden of England', is in parts a heavily industrialised county. Whilst earlier IRS volumes focused heavily on the mechanical engineering and histories of locomotives employed at civil engineering





works, factories, military and defence works, mines and quarries, those published more recently have included much detail about the sites themselves. Excluded are passenger railways and rolling-stock, and sites worked by horse-drawn vehicles.

This volume is highly recommended for all having an interest in, especially, the mineral industries in the county. The book is lavishly illustrated with colour and black-and-white photographs, location and site maps and plans. Understandably in this instance, but in common with railway history books in general, a preponderance of the illustrations feature locomotives blocking views of mine adits and shaft tops and associated buildings and plant, features all too seldom recorded by photographers. Of specific interest to members of Subterranea Britannica is the substantial section (pages 249–265) devoted to the Kent coalfield where the sinking of ten deep mines was commenced in 1896, of which only four ever successfully raised coal for sale, during the period 1906 to 1989. There are also substantial treatments of the contractors' lines (and their locomotives) used in the driving of the Channel tunnels and the Dartford road tunnel. There are huge numbers of entries for openwork minerals extraction sites, coastal defence works and the like, and even the Ministry of Munitions' 500-yard narrow-gauge line used in connection with explosives storage at Chislehurst Caves during World War I.

Tilmanstone colliery, east Kent

DETAILS: VARRALL, Colin, 2013, *Tilmanstone Colliery 1906–1986*. Elvington Heritage Group: 12pp.

This coal mine, six miles northwest of Dover, was one of

the four operated in the Kent coalfield, and in working the Milyard seam at a depth of 3,035 feet was amongst the deepest in the country. Shaft-sinking commenced in 1906, although no coal was raised for sale until 1913, and the mine closed in 1986. Of particular interest to members of Sub Brit is the aerial ropeway built to convey coal direct to bunkers at Dover's Eastern Docks.

Part of this ropeway ran through a pair of tunnels driven through the chalk cliffs at Dover, where the bricked-up portals can still be seen by persons arriving by ferry from France. The location of the country end of the tunnels is hard to recognise on the ground. This ropeway, operational from 1929, avoided the cost of sending coal to Dover by train, via Shepherdswell. It is featured in several historic photographs in the booklet. The author's father, grandfather and uncle all worked at Tilmanstone. The author is a Sub Brit member.

Underground World War II air-raid shelters in Paris

DETAILS: THOMAS, Gilles, 2017, *Abris souterrains de Paris: refuges oubliés de la Seconde Guerre Mondiale*. Paris: Parigramme: 13x18cm:144pp [ISBN 9782-37395-023-6] €12.90. This book presents historic and modern views and descriptive text relating to underground or created spaces used as air-raid shelters and is profusely illustrated with monochrome and colour photographs. As in London, underground railways and stations were widely used, although as most of the Paris Metro was created by the cut-and-cover method, so is at shallow depth, there were few very deep shelters. Most seem to have been reused pre-existing voids including basements and cellars.

Another difference from London is that Paris has a legacy of historic mines and subterranean quarries within the Greater Paris boundaries. Nearest the centre the building-stone quarries are best-known, one part of which is familiar to all who have visited the Catacombs. In the inner suburbs there have been extensive gypsum mines, whence came 'Plaster of Paris', although these being largely in a state of collapse have been mostly overlooked by potential secondary users.

Further out, as at Meudon, there are extensive chalk mines in good condition, these being in effect the French equivalent of London's Chislehurst Caves, but closer to the city centre. There are numerous illustrations of French and German signs and notices and written graffiti, plus a guide to further reading and to visitable sites.

The quality and number of photographs make the book worth having even if one's knowledge of the French language is a bit rusty. Gilles gave a presentation on this subject at our Spring Conference on 14 April this year.

NEWS – TUNNELS & TUNNELLING

Crossrail shafts and tunnels at the Limmo Peninsula, east London

The Limmo Peninsula site is on the east side of the river Lea near its junction with the Thames, about



two kilometres east of Canary Wharf. Passengers on Crossrail / Elizabeth Line trains, when they are running, will be unaware of two shafts, connecting tunnels, and the launch chambers for four tunnel-boring machines at this location. The shafts are 44.3 metres deep and 30 metres in diameter, and 39 metres deep and 27 metres diameter, respectively. The excavations were mostly in made ground, river gravels, and London Clay.

SOURCE: LINDE-ARIAS, Emilio, David HARRIS, and Richard GHAIL, 2018, Engineering geology and tunnelling in the Limmo Peninsula, East London. *Quarterly Journal of Engineering Geology and Hydrogeology* 51 (1), 23–30.

King William Street station used for new underground construction project

Deep under the City of London lies its oldest deep-level tube station, in use for less than a decade before it closed in 1900. King William Street station, the original terminus for the City and South London Railway has got a new lease of life.

The disused tube station sits right underneath one of the construction sites for the Bank tube station upgrade – a £500 million project to massively improve that maze-like tube station. When working in cities, pretty much every construction site manager will complain that there’s a lack of a storage space on the building site, while the public complain about why they seem to need so much space. What better to have under your feet than an entirely empty tube station?

The Bank Station Upgrade is digging a new much larger Northern line tunnel, and a travolator to speed up connections with the Central line. In order to do that, they needed to dig a shaft down from street level to reach the level where the new tunnels would be dug out. One site nearby which was offices is the main construction site and will later become a new entrance to Bank tube station.



*The upper level of the King William Street shelter in 1940.
This has now been demolished*

However, nearby is a small road that’s small enough to be closed off, but large enough to act as a secondary construction site – and it just happens to sit right over

the old King William Street tube station. That’s not a coincidence, but a deliberate decision by the winning contractor Dragados, who realised the utility of the site for their construction works.

Before the construction works started, a number of photos were taken of King William Street station as it is, so that its heritage could be recorded.

A large shaft has been dug down, and punched through part of the old tube station. This may sound horrific to historians, but much of the previous station architecture in that location had already been removed when the tunnels were converted into air-raid shelters. To maximise usable space, the World War II mezzanine has been removed in all areas except the three rooms near the entrance to the station, as was some 1970s blockwork.

The new shaft sees an average of 250 tons of London clay coming up and 120 tons of concrete going down every day, so it’s been an important addition to the upgrade project. When the tunnels are finished in August 2020, the shaft will be filled back in again, some of the important heritage restored, and the old tube station can go back to sleep, having performed an unexpected vital service in the improvements of tube travel under London.

[King William Street station was visited by members of Sub Brit in 2008. This was a private visit organised by Sub Brit member Philip Lindhurst.]

SOURCE: *Ian Visits* website, 21 April 2018.

Scottish railway tunnel filled with expanded polystyrene blocks

A 459-yard-long disused railway tunnel underneath the approach roads north of the Forth Road Bridge has been filled in after it was found to be degrading. It was part of the Dunfermline to North Queensferry railway line, providing a link to the ferry until the opening of the Forth Bridge in 1890. It continued to be used for freight until 1954.

It has a vaulted roof and brick lining. Both ends had been sealed off and the adjacent cuttings filled in, so the only remaining means of access was via a vertical shaft at each end. Engineers carried out a structural inspection in February 2016, finding that parts of the tunnel were degrading and in need of preventative maintenance.

Two options were considered: an ongoing programme of inspection and maintenance, or a one-off project to fill the tunnel with a low-cost material. The filling option was chosen as it would stop the need for future inspections or maintenance.

The tunnel has been filled with expanded polystyrene (EPS) blocks, which can be easily removed if the tunnel ever needs to be reopened. The blocks were passed down the access shaft and transported along the tunnel to the work face hooked onto a specially designed sliding monorail system.





There is already such a link for the Heathrow Express trains from Paddington. Construction would be from 2022 to 2028, including 15 months for the tunnelling. Several options for the southern end of the new line are presented, such as turning back at Terminal 5 and running through to Terminals 2 and 3, or with additionally running through to Paddington.

SOURCE: Network Rail, 2018, Heathrow western link planned for 2028 opening. *Modern Railways* 75 (837), page 12.

Israel destroys Palestinian tunnel that crossed into Israeli territory

Israel says its army has destroyed the

The tunnel was lined with a hydrocarbon resistant membrane, before a total of 21,342 blocks were installed. Once the body of the tunnel was filled, the access shafts were filled with concrete to seal the tunnel.

SOURCE: *BBC News Scotland*, 19 April 2018.

Five more kilometres of railway tunnel planned for Heathrow Airport, London

Network Rail is to consult on a new 6.5 km rail link from the Paddington–west country main line, of which five kilometres would be in a new tunnel running below Richings Park and Colnbrook. This would join the main line between Iver and Langley, and would allow trains from southwest England, South Wales, and the Midlands to run directly into the airport.

longest and deepest tunnel ever dug by Palestinian Islamists Hamas in April.

The 2km tunnel, which Israel says would have ‘cost millions to build’, allegedly began below the Gaza Strip and went on for several kilometres, well into Israeli territory. Israel says the Hamas tunnel was connected to several others within Gaza and it has now made it inoperable by filling it with material.

The tunnel crossed into Israeli territory by several yards but did not yet have an exit point. The tunnel came from the area of Jabaliya in the northern Gaza Strip and was being dug in the direction of the Nahal Oz community in Israel. It was the fifth Gazan tunnel destroyed by Israel in recent months.

SOURCE: *MailOnline*, 15 April 2018.

Summit tunnel on the Manchester & Leeds Railway, Lancashire and Yorkshire

The first long tunnel under the Pennines, Summit tunnel, was designed by George Stephenson [1781 – 1848] for the Manchester & Leeds Railway, later to be known as the Lancashire & Yorkshire Railway. The rather grand Manchester Victoria station, which the new line served, is worth a visit for its flamboyant architecture. The line took a somewhat circuitous route to allow easy gradients, and ran via Rochdale, Littleborough, Todmorden, Hebden Bridge, Sowerby Bridge, Elland, Brighouse, Dewsbury, Wakefield, Normanton, and then the NM Railway to Leeds.

Of the 12 tunnels on this route, Summit tunnel (2885 yards) is by far the longest, with 12 spoil extraction shafts, and was when it opened in 1841 the world’s longest railway tunnel. The first long tunnel under the Pennines, the Standedge canal tunnel, had already been driven in 1794 – 1811 with a length of around 5,500 yards, joined later by three parallel rail tunnels of similar length opened in 1849, 1871 and 1894.

Summit tunnel made international news headlines when,

on 20 December 1984, a tanker train caught fire inside it. The train crew were able to walk out unharmed, but the fire caused spectacular plumes of flames emerging through at least one of the shafts on the hillside above. So intense was the fire that the interior brickwork was vitrified. Services through the tunnel resumed on 19 August 1985.

SOURCE: HOLT, Allen, 1999, *A Pennine pioneer: the history of Summit railway tunnel*. Littleborough: George Kelsall: [4] + 90pp [ISBN 0-946571-39-5]



Public walkthrough of the Summit Tunnel days prior to its reopening to rail traffic, 17 August 1985. Photo S. Parish

Subterranea Britannica Study Weekend Budapest 11 – 14 May 2018

Martin Dixon



Kőbánya quarry. The ceilings of the original quarry were reinforced by arching and steelwork when it was converted into a brewery

This year 2018 marks the 20th anniversary of the first overseas trip that Linda and I organised for Sub Brit and our visit to Budapest in May was the twelfth continental European country that Sub Brit has visited during the intervening period. It turned out to be a fascinating weekend, with Saturday largely focused on public sites followed by Sunday's visits which were well off the tourist trail.

Budapest stands between eastern and western Europe – in the Cold War it was part of the Soviet Bloc but since 1990 has become hugely more westernised. As Hungarian composer György Ligeti said, “If you travel from Paris to Budapest you think you are in Moscow but if you travel from Moscow to Budapest you think you are in Paris.”

Geography and Geology

Budapest is essentially two cities separated by the River Danube. On the western banks are the hills of Buda and to the east the plain of Pest. The two were united in 1873 and form the historic core of today's city. The city is divided into 23 districts or *kerület*, designated by Roman numerals and which, in the manner of Paris *arrondissements*, rotate in a generally clockwise direction from the centre out. Most of the city's four million tourists a year are concentrated on just a few inner districts.



The plains of Pest, seen from the hills of Buda on the opposite bank of the River Danube

Geologically, Budapest is underpinned by Triassic dolomite and Eocene limestone covered by alluvial deposits from the River Danube. Budapest is unusual in having natural caves under the centre of the city which have been utilised and extended for human use over the millennia. The limestone horizons have also been exploited on the Pest side with the excavation of massive quarries whose output now lines the banks of the Danube.



History – Ancient and Modern

The Romans first settled what is now Budapest and named it *Aquincum* meaning abundant in water. The Romans were probably the first to exploit the city's thermal springs and started a long tradition of bathing in spa waters which continues today.

After the Romans left in the fifth century, Budapest was occupied by the Huns and later came under Germanic, Bulgarian and French influences. In the 16th and 17th centuries the city was under Ottoman rule until it became part of the Habsburg Monarchy (and later the Empire of Austria). The Hungarian revolution of 1848 failed to wrest the country from Austrian control but joint Austrian/Hungarian rule emerged in 1867.

After World War I, Hungarian territory was substantially shrunk and the country joined the Axis powers in World War II in an attempt to regain their territories. Many of the city's Jews tragically lost their lives during the period of German occupation, especially when the fascist Arrow Cross party gained power in 1944. The city was devastated both by the Germans (who blew up all the bridges over the Danube) and the advancing Red Army, who destroyed most of the Buda Castle district in particular.

Communist control

Democratic elections were held at the end of 1945 and the right wing Independent Smallholders Party won 57 percent of the vote. The communists (who only polled 17 percent) nevertheless participated in a coalition government and worked swiftly with the other minorities to establish their ruthless control.



The popular revolt of 1956 was ruthlessly put down by Soviet troops

‘Millennium’ Underground Railway). We were to visit all three areas over the course of our weekend. We would also see sites associated with World War II, the Cold War, and the 1956 uprising.

Outward Bound

A number of members extended their stay in Budapest, both to see more of the city and to take advantage of cheaper fares. Members arrived by plane, rail and road with at least two driving from the UK. Linda and I joined an advance party of seven who flew to Vienna and took the train from there into Budapest.

On arrival at *Keleti* (East) Station, we purchased 5/30 transport tickets. These provide for unlimited travel on any five 24-hour periods within a 30-day window on all public transport. Priced at 4,550 Forints they represent a real bargain at under £3 per day. For those fortunate to



The 1956 uprising saw thousands of people take to the streets to rebel against Soviet control. World War II shrapnel damage can still be seen on the building behind the tank

After the state security police fired on a peaceful anti-government protest in 1956 a nationwide revolution was started, only to be brutally crushed by an invasion of Soviet troops. In 1989, alongside the collapse of communism across the Warsaw Pact, free elections were held and the modern era began.

Today, three parts of Budapest are designated as World Heritage sites: the Buda Castle quarter; the Banks of the Danube; and Andrassy Avenue (including the



The impressive facade of our hotel which was a jewel of Soviet architecture when built in 1967



be over 65 (around a quarter of attendees), transport in Budapest is completely free.

The hotel we were staying in (Hotel Budapest) was built in the heart of the Soviet era, opening in 1967. It has fifteen floors and a circular cross-section with each room forming a segment of the circle. It is therefore known throughout the city as the *hengeres szálloda* or cylinder hotel. Linda and I stayed here on our first visit to Budapest in 1982 and were amused to find that the welcome we received still had more than a shade of Soviet bureaucracy (the registration form included 'Mother's maiden name' and 'Father's profession'!).

To the Hills

Most who those arrived early took the opportunity to travel on the **Children's Railway** or *Gyermekvasút*. Unexpectedly, this isn't a railway for children but instead one operated by them (perhaps luckily apart from the locomotive driver). Inaugurated in 1948, it runs for seven miles and has a 760mm gauge. Such railways originated in the USSR as a way of instilling a work ethic and public service duties to members of the Pioneer movement.



All 'staff' at the charming Children's Railway are aged between 10 and 14

Even after the break-up of the Soviet Bloc, a few dozen such railways still operate but the one in Budapest at over eleven kilometres is the longest in the world. The terminus at Széchenyi-hegy was easily reached from our hotel by number 60 tram (the cog-wheel railway). The route includes a short curved tunnel so is definitely Sub Brit material!



The Children's Railway operates open-air carriages in the summer on its 760mm gauge track



In contrast, a snowy day during the recce trip showing the portal of the curved Children's Railway tunnel.

Photo Martin Dixon

On Friday afternoon we'd arranged a visit to one of the natural caves beneath the city. Named **Pálvölgyi** (literally 'Paul's Valley'), the cave is part of the longest cave series in the Buda Hills and the third longest in the country. Discovered around a hundred years ago, the caves have been explored by potholers ever since and have been protected since 1944. Twenty-five early Sub Brit arrivals greeted each other like long-lost friends – a welcome extended to the new faces who are often not sure exactly what they have signed up for.



The entrance to the Pál-völgyi-Barlang (Paul's Valley Cave) is through an unassuming door

Overall the cave system extends to over thirty-two kilometres with around 100 metres vertical range. We ventured into the part of the system which has become a show cave under the guidance of an English-speaking guide, Lawrence Peter. We entered a distinctive yellow limestone passage and started our descent.

The caverns and passages are believed to be around two million years old and what makes them unusual is that they have been primarily eroded from within by thermal springs rather than by rainwater penetration. As a result, the ceilings were dotted with holes of the sort you would usually see in the beds of rivers in limestone country.

As a show cave we saw the usual speleotherm formations with names such as 'The Herd of Elephants' and 'Snow White and the Seven Dwarves'. One formation called

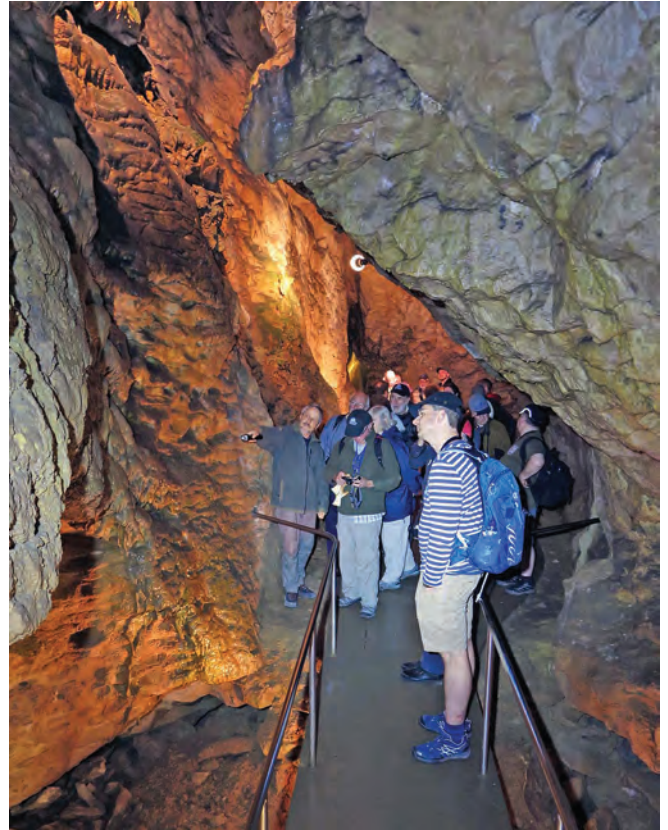


After entering the system, the Pál-völgyi-Barlang immediately starts a steep descent down a concrete stairway.



The ceilings of the cave complex show erosion pits from thermal activity within

‘The Sheep’ looked suspiciously like a Borrowdale Greyback. There were also some interesting calcite crystals, formed under high pressure; and a balcony overlooking an impressive seventeen-metre chimney. The through trip was around 600 metres and we descended perhaps 20 metres. The ascent back through a narrow gap was up some well-constructed stainless-steel steps and a short ladder section.



Our guide Lawrence pointing out some of the fascinating speleotherms in the cave system



The stairway through the cave complex is of exceptional construction

Although a natural cave, the fact that it has been exploited by humans makes it ‘man-used’ and thus well within Sub Brit’s scope! There are so-called ‘adventure’ tours of the complex for which full caving gear is required but these are described as limited to those between the ages of 10 to 55.

The Cave Church

On Saturday morning the full group (42 attendees) assembled and this included Benedek and Dominik Burgess – sons of Peter Burgess; both of them are students at Budapest University. Beni and Domi had generously agreed to act as translators for the weekend and their assistance proved particularly useful at the sites we visited on Sunday. The skies were clear and with a forecast high of 28 degrees we set forth.

Our first visit with the full group was to the **Cave Church** – a 20-minute tram ride away from the hotel at the base of the Gellert Hill. The place where Gellert Hill meets the River Danube was once known as Pest Port (*pest* is of Slavic origin and means cave). This is believed to refer to the large natural limestone cave visible from the river; it was originally known as St Ivan’s Cave after a hermit who lived there and healed the sick with the adjacent thermal waters.



Some of the fine wood carving in the Monastery behind the Cave Church

During World War II the monastery was used by the German military and the destruction of Franz Joseph (Liberty) Bridge was directed from here. In the communist era, the monastery was forcibly closed and by 1950 the entrance had been blocked by a substantial concrete wall. During this period, the monastery was used as accommodation by the State Ballet. A connection with the water source for the thermal waters meant it was also used as a water inspection station although this connection has now been blocked.



The entrance to the Cave Church. Traces of the concrete that blocked the entrance in Soviet times can still be discerned

In 1924 the cave was extended to form a reproduction of the famous Catholic shrine at Lourdes. These extensions effectively created two churches – on upper and lower levels. Further expansion took place in 1934 when a neo-Roman monastery was added to the site.



Another Cave Church side-chapel. St Gellert to the left was the first Bishop of Hungary and was martyred by being thrown off what is now known as the Gellert Hill



One of the side chapels in the Cave Church, showing some of the stained glass and statuary. Most of the walls have been shot-creted but small amounts of native rock remain



Worshippers receiving Communion in the Cave Church during our visit



After the fall of communism, the site was returned to the monastic community and reopened for worship, although traces of the concrete wall can still be seen in situ. We were issued with an audio guide (in English) in what was the original, natural (St Ivan's) Cave. This helped explain the various chapels, statues and relics within. As luck would have it, as we entered a Mass was in progress so we were able to appreciate the church in action, so to speak, rather than just as a museum.

Almost the Oldest Metro in the World

We then ventured onto the metro system to continue our exploration. The system has four lines –imaginatively named M1, M2, M3 and M4 – which together form a fascinating encapsulation of underground railway construction and operation through the ages. The lines are distinguished on maps by the use of colours (yellow, red, blue and green in order of construction). We started our exploration on line M4 but I'll tell the story of the network in order of construction.



Line M1 has its place in history as the first underground railway in Continental Europe. Constructed on the Pest side by cut-and-cover, the logic for going underground was to avoid affecting the fine architecture and views of Andrassy Avenue above (not unlike Hindhead tunnel or the Clifton Rocks railway in the UK).

The line opened in 1896 and is known locally as the *földalatti* (the underground) rather than the Metro designation of the later lines. This is easy to explain as it predated the Paris Metro (itself named after London's Metropolitan Railway) by four years but perhaps it should be designated F1.

Line M1 is also known as the **Millennium Railway** as its opening marked 1,000 years since the arrival of the Magyars or 'true' Hungarians. It is part of the designated World Heritage Site and as such is maintained in near-original condition, without modern signage or destination displays. The tile-work and wooden panelling are particularly impressive. Surface entrances are very

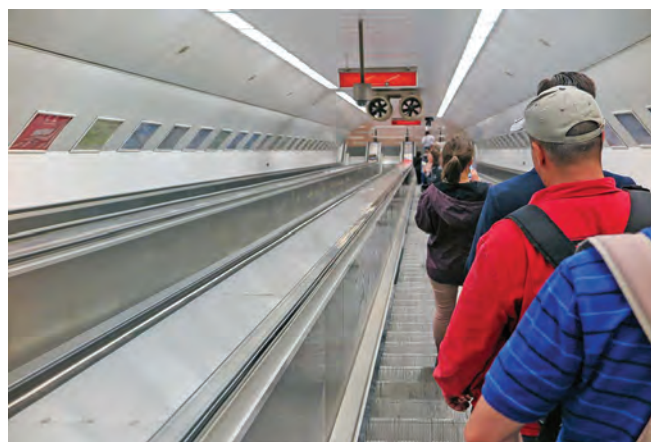
reminiscent of the early Paris Metro and the limited loading gauge dictates that specially-built stock is utilised.



Platform of the historic line M1 or földalatti railway. Note the decorative cast iron capitals on top of the girder roof supports

Deep Secrets

Metro Line M2 was the first to extend beneath the Danube to Buda. Early plans date back to 1942 but agreement to build only came in 1950 after World War II. Construction stopped between 1954 and 1963 and the line was finally opened in 1970. Stations have a feel of the Moscow system but on a much smaller scale. Széll Kálmán tér (the nearest station to our hotel) is the deepest station on the entire network at 38 metres below ground. Until 2011 this station (and square) were known as *Moszkva tér* (Moscow Square).



The longest escalator on the Metro system at Széll Kálmán tér station. Unlike the London Underground, the posters are parallel to the handrails rather than vertical which induces a certain feeling of vertigo

When Line M2 was constructed, the opportunity was taken to build a deep-level nuclear shelter close to the Parliament Building. Officially known as the F4 Object, it is popularly known as the Rákosi shelter (after the communist leader Mátyás Rákosi who oversaw its construction).

The construction workers were told they were building passages for the metro and it therefore resembles line M2 tunnels. It is believed to have a direct link with the Parliament Building so the Central Committee and others could reach its shelter. Accommodation for over 2,000 people has been suggested.



Station and train on line M2 of the Metro system at Széll Kálmán tér

The shelter would have had filtration, water, electricity generation and everything else needed to survive a nuclear strike. The bunker had a connection to line M2 of the metro from where the Central Committee would have travelled to Keleti (Eastern) Railway Station and boarded an armoured train should evacuation ever be necessary. The bunker complex has been out of use for some years but is inspected by the metro authorities on a regular basis. We asked for permission to visit but this was politely refused. I imagine forty Hungarians asking for permission to visit *Burlington* would get a similar response!

The Pest is yet to Come

Metro Line M3 is the longest line in Budapest and runs roughly north-south entirely on the Pest side. Construction was started in 1970 and progressed much more rapidly than line M2, with the first stations open by 1976. The rolling stock on the line is common to many former Soviet states, designated *Metrovagonmash* 81-717/81-714. At present the northern section of the line is closed for refurbishment and at weekends the entire line is closed so we were unable to explore as a group although many sampled it from and to the airport.

The final line (M4) was approved in 1976 but the decision was taken to extend line M3 instead so construction only started in 2006. The opening date was allegedly delayed a total of 17 times and opening eventually came as recently as 2014.

This line is similar to London's Jubilee line, with its ten stations being built as top-down boxes and the circulating areas and platforms being airy and modernistic. The station at *Szent Gellért tér* where we boarded has particularly fine tilework which creates the impression of a vortex.

Despite its recent opening, line M4 has no platform screen doors to improve safety but instead the warning line over which passengers should not step is automatically monitored and those who step over are 'greeted' by warnings in Hungarian and in English. As the trains are



The ultra-modern Szent Gellért tér station and train on line M4 of the Metro. Each station has a different decoration - in this case impressive mosaic tiling.

The countdown clock to the next train includes seconds

driverless, it was inevitable that many of the Sub Brit group took the opportunity to board at the very front in order to 'drive' the train. Rolling stock is by Alstom and the project cost was around 1.5 billion Euros (1.5% of Hungary's GDP) making it one of the most expensive metro systems in the world.

Keleti Station

We took a breath of air at *Keleti* station which although above ground was well worth a visit and provided many options for lunch. *Keleti* (East) station was constructed between 1881 and 1884 and both then and now is one of the most visually impressive stations in Europe.

Of particular interest are the statues either side of the entrance arch. These commemorate James Watt and George Stephenson as pioneers of railway engineering. Extensively damaged in the 1945 Battle of Budapest, the building was restored after the war to its former glory. Today it continues to act as the main Budapest terminus for international and intercity services.

From the station it was a short walk to **Kerepesi Cemetery**, known officially as Fiume Road National Graveyard. First opened in 1847, the cemetery is similar to London's Highgate West or Père Lachaise in Paris. It extends to 56 acres and includes monuments and memorials to many of Hungary's politicians, artists, scientists and soldiers.

Our visit coincided with 'National Monuments Day' when many state-owned buildings were open for public viewing including a number of most impressive mausoleums. These included the resting place of Lajos Kossuth, the Hungarian lawyer who was Governor-President of Hungary during the revolution of 1848-49. Inaugurated in 1909, the centre of the immense mausoleum is a massive green onyx sarcophagus, and above are brilliant mosaic tiles of Murano glass and gold plate. The building was damaged in both World War II and the 1956 revolution but has recently been restored by the government.





The impressive green onyx sarcophagus of Lajos Kossuth, the Hungarian lawyer who was Governor-President of Hungary during the revolution of 1848-49. Above his tomb, the ceiling of the mausoleum is tiled with a mosaic of Murano glass and gold plate. Photo Peter Burgess

Subterranean Subterfuge

Exquisite though it is, the Kossuth Mausoleum is largely above ground so we headed to two others which held subterranean secrets. The first of these was the grave of Count Lajos Batthyány, Hungary's first Prime Minister. After the failed revolution of 1848-49 Batthyány was executed by firing squad by the Austrian Empire in October 1849 for continuing to pursue separatist policies. To avoid the grave becoming a place of pilgrimage for other nationalists, it was decreed that he should be buried in an unmarked grave.

His followers however had other ideas and deliberately dug the grave too small for the coffin. The priest therefore took the coffin back out of the cemetery and



Linda ascending from the depths of the impressive travertine mausoleum of Count Lajos Batthyány, Hungary's first Prime Minister. Photo Martin Dixon

it was secretly stored until political circumstances were more favourable for a ceremonial burial. The officials quite naturally did not suspect that a hearse leaving the cemetery would be anything else but empty.

The mausoleum is flanked by impressive lion sculptures and obelisks that were only added in the year 2000 (the money for the original monument ran out). Adjacent to the sculptures, trap doors had been raised and it was possible to descend to see the coffins of Batthyány and his family, their varying sizes showing that some died young.

Soviet Idealism

Another mausoleum with a fully underground resting place is the **Labour Movement Pantheon**. Although the cemetery was effectively closed for burials in 1952 by the occupying Soviets, they did build an impressive final resting place for the great and the good of Socialist Hungary. Above ground are a number of large sculpted panels and statues and the motto which translates as 'Communism made the Nation'.



The surface features of the Labour Movement Pantheon in Kerepesi Cemetery. Inaugurated in 1959, the structure was designed by József Körner and serves as the burial place of those who helped build socialist Hungary. Underground there is space for 365 cremation urns for the most important citizens (selected by the Central Committee of the Hungarian Socialist Workers Party). Above ground the pillars serve as a memorial to those buried elsewhere.

The inscription at the rear roughly translates as "for Communism and the People who lived it"

There are also some above-ground burial niches but as ever, the underground chambers drew us downwards. Here we saw dozens of urns with names and dates of the departed. The pantheon was designed to hold 365 urns but only 75 of these have been filled.

The decision on who was offered this decidedly superior accommodation was taken by the Central Committee of the Hungarian Socialist Workers Party. Alongside the urns are some superb bronze bas reliefs showing the ideals of Soviet citizenship – family life, industry, arts and science – and images of Lenin and the once ubiquitous hammer-and-sickle.



Cremated remains beneath the Labour Party Pantheon in Kerepesi Cemetery. Names are displayed in the Hungarian form with the surname first. The underground chamber was reserved for the most important citizens in the Soviet era so the places within had to be urn-ed. Photo Neil Iosson



Impressive Bronze Plaque in the crypt beneath the Labour Movement Pantheon. Lenin (top left) looks down on some of the ideals of Soviet life including family life, film and theatre, science and architecture. Almost all similar communist era tributes above ground are long gone so this underground space has preserved some important historic imagery. Photo John Coates

Other mausoleums are on a smaller scale – some immaculately kept and others gently decaying like, presumably, their occupants. There are also thousands of gravestones, amongst them the casualties from both sides of the 1956 revolution. It struck me as very unusual that the opposing sides should be buried in such close proximity. The Soviet soldiers each have a red cross on their grave



The immense Apponyi Hearse named after its first passenger

whereas the nationalists are honoured by ribbons in the colours of the national flag (red, white and green).

Overall the cemetery has a magical charm where history and nature live peacefully together. A small museum on site is devoted to burial history and practices although it is closed for refurbishment at present. One exhibit that is still on display outside the museum is the massive Apponyi Hearse which was drawn by four pairs of horses.

Millennium Metro Museum

After lunch we made our way to the delightful metro museum which opened in 1975 and commemorates the first underground railway of continental Europe. It is contained within an original passageway at *Deák tér* metro station which became disused during the construction of line M2. Connecting as it does lines M1, M2 and M3, *Deák tér* is one of the busiest stations on the network.

The museum contains carriages, seats, photos, documents and models, and details of construction methods. The ceiling had to be removed and the carriages lifted in by crane as the site was originally for passenger circulation rather than a running tunnel. The original station name was *Gizella tér* which can be seen on period tiling. Most of the exhibits have English labels which is helpful.



Early underground train in the Metro Museum. The solid overhead power lines can be seen just inches above the carriage
In pride of place at the museum is a marble plaque which recounts that Franz Josef (Ferencz József), visiting Budapest on the occasion of the millennial celebrations, travelled by the underground railway with his entourage on 8 May 1896;



The interior of one of the passenger carriages was available to rest in

he ‘permitted most graciously’ the underground railway to be named after him. Thus, the company with the previous name Budapest Underground Electric Tramway attained the company name Franz Josef Underground Railway.

The museum was refurbished in 1996 by transport operator BKV to commemorate 100 years since the original opening of what is now Line M1. A small shop is on site which included some original metro and bus route maps and signs which retailed at an affordable £3.

Twinned with Marlow

Our final site of the day was back across the river in Buda, atop Castle Hill. We took a bus (well two actually, as they are very small to get up the hill) across the famous Széchenyi Chain Bridge (*Lánchíd*).

This crossing, rebuilt after World War II, is particularly fine and was originally opened in 1849 to a design by Englishman William Tierney Clark. It is a larger version of Marlow Bridge over the Thames, also designed by Clark and dating from 1832. To celebrate this connection, Marlow is twinned with Budavar (Budapest district 1).

On the far side of the bridge we passed the entrance to the **Buda Tunnel** – opened in 1856 to allow traffic to pass through Castle Hill rather than round it. The eastern portal has a particularly fine classical treatment. At 350 metres, the tunnel is very close in length to the Chain Bridge and the folklore is that the tunnel was built so that in rainy weather the Chain Bridge could be withdrawn into the tunnel to prevent it getting wet!



The Buda Tunnel from within looking east; beyond can be seen the famous Chain Bridge of 1832

After admiring the view from the terrace adjacent to Matthias Church, we walked to the western ramparts and descended into the *Sziklakórház Atombunker Múzeum*, known in English as the **Hospital in the Rock**. This extensive site sits beneath Buda Castle Hill and is based on a natural cave system, adapted over the years for use as cellars and stores for the castle above. In anticipation of World War II, a section of the caves was converted into an air-raid control centre in 1937.

Underground Hospital

We were welcomed by two English-speaking guides and shown how from 1941 an underground hospital was created beneath the many government offices above. It includes three wards and an operating theatre and was opened in February 1944. It saw extensive use after the American bombing raids on the city later that year. At its deepest point it lies eighteen metres beneath the surface and operated as a satellite of a surface hospital but was fully self-sufficient with its own generator.



The entrance to the Hospital in the Rock today, positioned beneath the ramparts of Buda Castle.



The same entrance to the Hospital in the Rock, taken during the siege at the end of WWII

During the siege of Budapest of 1944-45 (which lasted 100 days), all 94 beds were constantly in use and the surrounding cave system was also utilised; both civilians and the military were treated here.

Eight Jewish Doctors worked at the hospital and were given military uniforms as a cover by the local police chief. Sadly two were betrayed and one shot while the other was sent to a concentration camp. We were told gruelling stories about how patients were crammed three to a bed and that when supplies ran out bandages had to be reused without sterilisation.

Immediately after World War II, the hospital was closed and the facilities were used for two years to produce Typhus vaccine. The hospital was brought back into use during the 1956 revolution and treated both military and civilian casualties of the uprising and its brutal suppression.



One of the wards in the Hospital in the Rock, simulating the crowded conditions during wartime. Photo Sziklakorhaz



The operating theatre within the Hospital in the Rock. At times instruments and bandages had to be reused without sterilisation. Photo Sziklakorhaz

Between 1958 and 1962 the site was reconstructed and became a **nuclear bunker**, with enhanced air filtration, water supply and emergency exits installed.

In its Cold War role, there were regular exercises and the Civil Defence Forces used it as a store. The sheets on the beds were changed every fortnight, ready for a disaster that, thankfully, never arrived. By 2004 the hospital became redundant and was occasionally opened for visitors. After renovation work, it opened in its current form in 2008 and now functions as a national collection. There were amazing displays of original medical supplies and artefacts.

The tour takes visitors on a complete tour covering all periods of use and finishes with some artefacts from Hiroshima and Nagasaki showing the destructive power of nuclear weapons. Some of the images were only visible through viewing eyepieces well above the height of young children.

There was also the opportunity to operate a hand-cranked siren which Andy Catford revelled in taking up to full volume, to the amazement of the guides. They'll probably think twice before offering future English groups the opportunity.



Andy Catford wins the award for the longest and noisiest activation of the hand-cranked siren

On the Wagon

After time to refresh at the hotel, some of us sought out cheaper beer than the hotel at a small bar adjacent to the cog-wheel tram terminus. Immediately christened *The Rack and Pinion*, the beer was excellent value at £1 a pint. A short tram ride then brought us to the venue for our evening meal. We'd booked out a nearby restaurant, atmospherically located in a former railway carriage and named the *Vagon*. This was across from the South railway station (*Déli pályaudvar*) known universally as the Déli.



A full house for the Sub Brit evening meal in the Vagon Restaurant



The staff did well to serve the packed carriage from a small kitchen (galley?) and the food was typical simple Hungarian fare. It was a good chance to get to know more recent members on the weekend. The other benefit of our location was that the following morning everyone had clear heads as we'd all spent the previous evening 'on the Wagon'...

Kőbánya Quarry and Cellar System

Sunday dawned fine and bright again. Today all the sites we were visiting were well off the beaten track and so

we picked up packed lunches from the hotel and embarked on a coach that we had hired for the day. It came complete with toilet which was a further bonus.

We drove east to District 10 of Budapest which is known as *Kőbánya* and translates literally as 'stone quarry'. The name of the suburb derives from the (estimated) 35 kilometres of underground passages of the former limestone quarry beneath. The earliest records of the site date back to the thirteenth century and most of the iconic buildings in

Budapest – Royal Palace, Parliament Building, Opera House and so on – were constructed from the stone extracted here.

Having met our guide Zsuzsanna Paunoch, we descended down a drift entrance and found that the passages were on a grand scale, being up to six metres wide with some of the chambers ten metres high. Beni and Domi really earned their keep on Sunday by translating often obscure facts – and even more obscure questions.



The plan of the Kőbánya system, showing the extensive network of passages. We entered centre top although where we eventually exited is less certain!



The drift entrance to the Kőbánya quarry system, up which the Me109s from the wartime factory would have been hauled



The group being shown the plan of the Kőbánya quarry
Thirty kilometres of underground passage are still accessible and we were to traverse just under two kilometres. Most of the complex is on a single level but some lies at a lower level which is now flooded and used by cave divers. At its deepest, the site is around 45 metres underground.



The initial entranceway to Kőbánya has a cobbled floor and recent roof protection

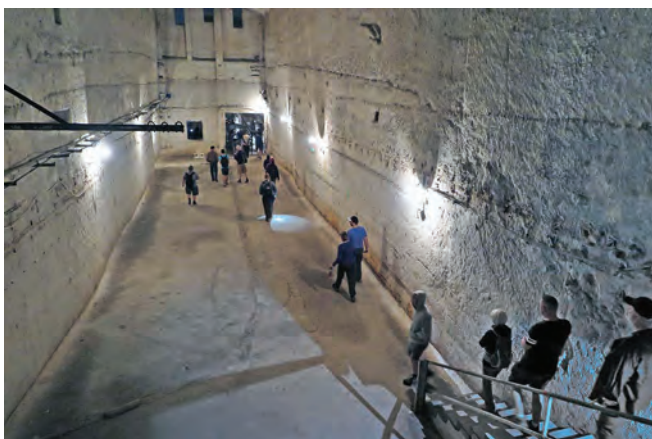
Impressive though the quarry is, it is its subsequent reuse that adds particular interest. When mining ceased in the 1890s, the land above was used as vineyards and so the quarries became a convenient place to store wine. Soon after this, other parts became a brewery and the large brewer Dreher still owns part of the complex. This explains why many locals call the site 'cellars' even though this usage is secondary to the original function.



Main passageway in Kőbánya. The chutes behind the group were used for delivering raw materials during its time as a brewery

Underground Fighters

Towards the end of World War II the local residents used the Kőbánya quarry as air-raid shelters to escape heavy Allied bombing. The main target of the bombing was industrial and transport infrastructure but one site escaped damage.



The scale of the original limestone quarry at Kőbánya is apparent from this shot

Part of the cellar complex had housed a German underground aircraft factory, where the engines and fuselages of over a thousand Messerschmitt Bf 109 fighters were assembled. We were told that the drift we descended was the exit ramp in World War II for the completed airframes. Ammunition was also stored beneath ground for protection.



The entrance to the protected control rooms of the wartime aircraft factory

As the Russians approached and Budapest was heavily shelled, aircraft production ceased and the quarry again became a shelter for the civilian population. After the war there was some limited mushroom cultivation and the brewery restarted production (but now under state control). We were told that the final member of the Dreher brewing dynasty died in a mental hospital after losing his brewery – a somewhat bitter end.

Our visit took us through areas where we could see evidence of all the periods of use. Nearly all of the raw working faces were concreted over and the roof was strengthened in places by brick arches and girders (and more recent rock bolts). Stairways leading to lower levels were flooded but we saw a frogman emerge from one such like in a real-life James Bond film.



The lower levels of the former quarry at Kőbánya are now flooded and used by local diving enthusiasts. Some of the group caught a glimpse of a diver emerging from the bottom of a stairway. photo Mike Cox

A Bicycle made for Two

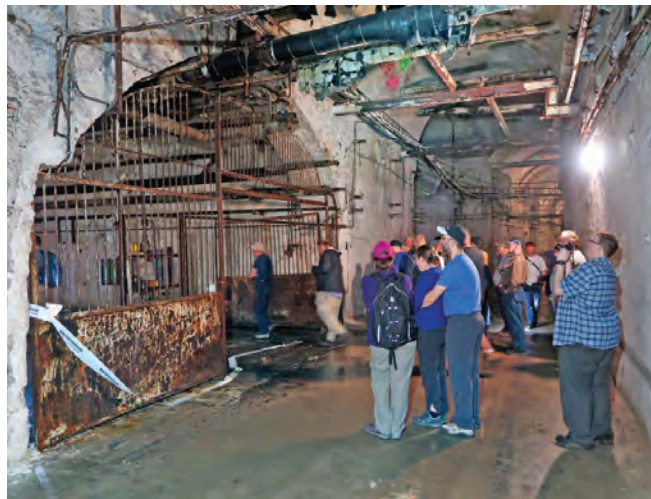
One area, protected by airtight blast doors, was a bunker which held the control rooms for the wartime factory. The ventilation system here had an unusual side-by-side dual cycle for pedal operation. Built largely on a grid system, each passage and cross-passage in the quarry had a numeric designator, affixed in the manner of a metal street sign. The passages went up to number 264, with the control bunker being numbered 1.

We were told that up to six brewing areas were in operation at the peak and could see chutes from the surface down which the raw materials (hops and barley) would have been fed. Water came from deep wells within the quarries and we were able to view a massive cistern formed by blocking off a side chamber.

A large boiler room occupied one of the larger chambers and would have fed the various factories through a massive 'central services' tunnel. Elsewhere we examined a distillation plant that would have produced some form of spirits.



Side by side seating for the unusual pedal-operated two-place emergency ventilation system in the control room of the World War II aircraft factory within the Kőbánya quarry. Photo Martin Dixon



The large boiler room was in a secure chamber off one of the main thoroughfares

Building Altar-ations

One of the largest chambers we visited had arches in a much more artistic rather than functional style. We were told that this was one of three chapels built underground during World War II, one for each of the three main denominations (Catholic, Calvinist and Lutheran?). Altars from above-ground churches were both sheltered and used down here. Apart from recreational diving, the site is occasionally opened for tours and an annual underground running competition is held through the corridors.

The whole site had an amazing atmosphere and was one of the highlights of the weekend. Most of the complex is owned by the local Kőbánya authority and we are grateful to the mayor Róbert Kovács for giving special permission for our visit. Part of the charm is in its abandoned condition and it is to be hoped that future developments do not spoil this.

We exited by a long staircase cut through the native limestone and found ourselves in the sunlight at a villa which was the summer residence of the Dreher



One of the immense chambers converted to a Chapel in the Kőbánya complex during World War II



The people in the distance help give scale to this main thoroughfare

family. Although long abandoned (brewing had stopped underground around 1990), the building still had some fine glazed fireplaces on the ground floor.

As a bonus there were some cellars, obviously used as a kitchen and for domestic staff. Even more exciting was a small barrel-roofed air-raid shelter at a deeper level which had an emergency exit ladderway connecting back to the surface.



The underground kitchen in the basement of Dreher's Villa
Under Csepel

We reboarded our coach, for our afternoon sites lay some distance away in Csepel. Pronounced *Chepel*, the suburb became part of Budapest only in 1950, as District 21. Being on an island, it is the only district of the city that is in neither Buda nor Pest. Earlier settlements on the site were destroyed first by the Ottomans and later by the great floods of 1838.

In the twentieth century the area became an important industrial centre. During the Hungarian uprising of 1956 the last stand of the resistance fighters was made in Csepel. We were to visit three sites here, each playing their part in three different conflicts of the last century – World War II, the Hungarian Revolution of 1956 and the unfought Cold War.

In a residential area we walked the final few hundred yards to what is now Tamariska Park. Here we met our guide György Varga alongside a descending path that disappeared into the hillside. The hillside was largely sand – presumably alluvial deposits from the river – and as we entered the hill we dropped back sixty years.



The entrance to the Tamariska Shelter is down a drift and the extensive volunteer restoration work is evident

The tunnel led to what is known as the **Tamariska air-raid shelter** which was built on a grid system sometime in the 1950s. The shelter was formed of precast concrete with a parabolic cross-section – a little like just one of the famous McDonalds arches.



This passage shows the distinctive elliptical form and has been kitted out as a dining area

We were told that it had been constructed by inserting the concrete linings and then excavating the passage beneath using water pressure. It wasn't clear how the linings were physically inserted, nor how the resultant slurry was removed. The sections were around 40cm thick with the floor a reported 10cm of concrete. At junctions the concrete was strengthened to around a metre thick.



Crossover in the Tamariska Shelter shows the extra reinforcement at junctions

Revolution museum

Around half of the shelter has been recently set up as a small museum of the 1956 revolution by local enthusiasts and there were images and artefacts from this period. It was opened in 2016 to mark the 60th anniversary.



The entrance passage at Tamariska has been laid out with artefacts telling the story of the 1956 uprising

There was an example of the flag used by the nationalists in the uprising – the Hungarian tricolour flag with a hole in the middle. This hole marked where the communist coat of arms (incorporating both hammer-and-sickle and red star) had been removed as a physical symbol of rejection of the Soviet regime. Another siren offered a chance for someone else to turn the handle.



Plan of the Tamariska Cold War air-raid shelter. The area normally open to visitors is coloured white but we were allowed throughout the complex. Top left is part of the original World War II shelter

Our guide opened gates normally closed to visitors and we were able to visit the full extent of the shelter, including air filter rooms and toilet facilities (with curtains rather than more substantial cubicles). Beyond the Cold War section another door led to a part of the shelter, dating back to World War II. This was evident as the walls were vertical and constructed of bricks and mortar. Beyond a closed blast door we understood a



Filters within the Tamariska Shelter within the air-handling room

collapse blocked further progress to what would have been an alternative exit.

We were told the shelter was used in World War II during attacks on a nearby armaments factory. In November 1956 it again sheltered local residents as Soviet armoured units entered Csepel to put down the thousands of resistance fighters. Its later use is uncertain although it may have been used as a military store. After abandonment it was used by the homeless until reopening as a memorial to the 1956 uprising.

Command and Control

After a short coach ride we arrived at what appeared to be an innocuous secondary school built in the early 1960s. During the Cold War, a Command Centre was built in each district of Budapest which would have provided shelter for the communist leaders and their staff in case of a nuclear war. The top secret **Csepel Command Centre** in Csepel was constructed in the basement of the school at the same time as the school building itself was erected.



Our knowledgeable guide József Babán to whom the bunker owes its survival alongside our equally enthusiastic translator Beni Burgess.

We were met by our enthusiastic and knowledgeable guide, 82-year-old József Babán. József has worked to ensure that the bunker has been preserved after it became



The entrance to the Cold War Control Centre is an unassuming door adjoining a large school

redundant in the 1990s. Most of the public knew nothing about it until 2010 and many locals who went to the school above had no idea it existed.

As we descended steps into air-locked blast doors, we were truly immersed in 1960s Soviet culture and technology. A display on the inside had examples of the ID badges that would have permitted access. There was a small decontamination suite for use if entry were made after a nuclear attack.



Standby generator near the entrance of the Csepel Command Centre

Near the entrance was the generator room and adjacent air handling room (still operational); we understood that compressed air cylinders would have been used if the ventilation system had failed. Opposite was the kitchen/dining area which was fully supplied with the original equipment from large saucepans to individual coffee machines. On the walls were lots of training posters about how to behave following a nuclear attack. This extended to illustrations showing how to rinse off fallout from radiated cows.



A poster showing in detail how to wash nuclear fallout from livestock, vehicles and foodstuffs



Filter banks and air-handling equipment in the Csepel Control Centre. No evidence of manual operation in the event of power failure

Room after Room

The decor was also authentic 1960s with bright oranges predominating. Male and female dormitories followed along the central spine corridor and further along lay a medical room, not only full of first-aid material but also with authentic wounds for training sessions.



Bunks of the main corridor in the Csepel Cold War Control Centre

Next was an electrical switchgear room and opposite, a room full of communications equipment. Still more to come – a scientific room with Geiger counters and chemical weapon testing kits and next door, a small telephone exchange.



Beyond a mass of geiger counters, gas masks and protective clothing lay the emergency exit passage

Off one of the meeting rooms was a half-height escape tunnel which doubled as the air intake and also housed the access door to the well beneath it. With permission many of the group took the opportunity to go through the tunnel and ascend a ladder from where louvres gave a view of part of the school.

Then came the commander's office, complete with a period bust of Lenin on the desktop. At the end of the corridor was a large conference/training room with more posters and equipped for showing 16mm films (a stock of which also survived in a cupboard). Finally, male and female toilets, all in full working order unlike so many we come across in Cold War sites.



The briefing/training room within the Csepel Control Centre is remarkably intact and furniture, posters and other equipment are all original

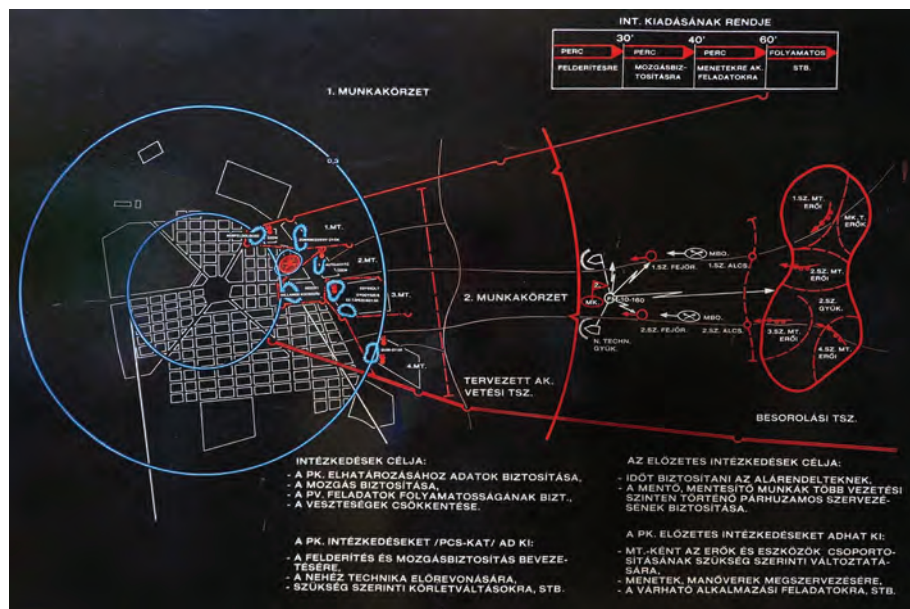
We reluctantly reboarded our coach and drove to our final sites of the weekend. Still in Csepel, we drove northwest to the heart of the industrial area.

From Pins to Aircraft

In the first half of the last century, the Manfréd Weiss Steel and Metal Works in Csepel was the largest machine factory in Hungary. It was an important producer of the army's ammunition and materiel and after World War I reverted to producing non-military items – 'everything from pins to aircraft'. In World War II, military production again came to the fore and it made all types of equipment, from aeroplanes and munitions to automotive engines, tanks and jeeps.



The outside of Hochbunker number 2. The Cold War number can still be seen on the outside



Training diagram showing the effect of a nuclear attack at different distances from the point of explosion

All in all, József and his team have worked wonders in preserving intact one of the most remarkable Cold War sites I have ever seen. As I've said, each of the 23 districts of Budapest once had their own Control Centre but the one in Csepel is now the only one remaining. Along with our grateful thanks and three resounding cheers, we handed over some copies of *Subterranea* with articles on the equivalent UK Cold War Control Centres.

To keep the wartime production on track, the 40,000 factory workers needed proper protection from possible aerial attack. Between May and June 1943 eleven above-ground air-raid shelters were constructed (known to the Germans as *hochbunker*; literally 'high bunker').

These were constructed above ground partially for speed and partially to avoid problems with the high water table. The side walls of the shelters were made of 1.8m-thick reinforced concrete. At a later stage the ceiling width was increased to four metres to provide extra protection. Officially these shelters were for key workers only with lesser employees having to make do with reinforced cellars or similar.

Csepel Factory air-raid Shelter number 2

After the first large Allied airraid in November 1943 a further six, much larger, shelters were built making a total of seventeen in all. The total capacity on completion was officially 20,000 people. Remarkably sixteen of these shelters survive and we were first to visit one of the smaller shelters – originally built as number 8 but later designated number 2. The numbering was never fully



sequential: there were no shelters designated 7 or 17 as these numbers sound very like 2 and 12 in Hungarian.



Our guide to the Csepel air-raid shelters Levente Somogyi briefs the group with the help of Domi Burgess in front of shelter number 2

We met with our guide Levente Somogyi ('Levi') who leases the shelter and has populated it with a mixture of original and period fixtures and fittings. Levente runs a small tourist company and the site is accessible to organised groups only. The shelter had a number of what felt comparatively small rooms but it would have been standing-room-only as the raids continued.

On 27 July 1944 the factory was nearly demolished by 328 (2000 pound) high-explosive bombs and more than 150,000 incendiary bombs. As outside became an inferno, ash and scorching air was drawn in through the



Stairway to the upper level in Csepel shelter number 2 ventilation system. The options seemed to be to suffocate or be roasted.

First Hand Reports

Remarkably, Levente has tracked down almost twenty locals who used the air-raid shelters in World War II. He did this by putting up posters across the local area and then (with permission) recorded interviews with the shelterers.

Although these recordings are in Hungarian, he had gone to the effort of adding English subtitles and one of the rooms was showing these interviews. The fear of those inside, worry for relatives outside the shelter and the unworldly horror that faced them on their eventual exit were common themes.

The rest of the rooms in the shelter were full of material and effects from both World War II and the Cold War – they were still being maintained and used for exercises up to 1996 and only officially released in April 2013. Once again a hand-cranked siren beckoned – our fourth of the weekend. Levente issued us each with a replica Cold War certificate of Civil Defence training as a record of our visit.



The small scale air-handling plant in shelter number 2 at Csepel with training posters on the walls



Toilets within shelter number 2. These used earth rather than a chemical solution

Finally we had time for a brief look at one of the larger shelters – built as ‘C’ and later numbered 9 – a designation still worn proudly on its side. Like many of the structures, this one was being used as studios and rehearsal spaces. We could only access the dual stairways but were able to appreciate the much bigger building size with four storeys and a larger footprint. The new use of the bunker was evident from the loud rock music emanating from some of the rooms and the sweet smell of herbal cigarettes permeating the stairwells.



The outside of Csepel shelter number 9. One of the larger versions, the Cold War number can just be discerned to the left of the ladder to the roof



Inside shelter number 9. Most of the individual rooms within are now used as rehearsal space

After a superb day of visits, we were dropped at the hotel with time to freshen up and then enjoy a buffet dinner at the hotel. With no early start on the morrow the talk and drink continued well into the evening.

Come Monday morning, some members started their journey home but others had extra time for other sites in the city. To mention just one more that had been on the possible list for the main weekend, several of us visited the atmospheric **Memento Park**.

Soviet Heroes

This park was set up after the end of the period of Soviet occupation. In many cities, the many statues and memorials that glorified communism and its leaders were quickly crushed or melted down. In Budapest, the city authorities decided to preserve a representative sample which was chosen in conjunction with local mayors.

Dating from between 1947 and 1988, the monuments originally stood in parks and squares and on hilltops across Budapest. Immortalised in bronze and stone, the great Soviet leaders lay frozen in time with the echo of their revolutionary words around them. Particularly resonant was the statue of Lenin that had once stood at the gates of the Csepel Iron and Metal Works that we had visited the previous afternoon. It had been installed on the direction of the then Soviet first secretary Nikita Khrushchev after a visit to the works in 1958.



This imposing statue of Lenin is now in the Budapest Memento Park but once stood at the gates of the Csepel Iron and Metal Works. Photo Martin Dixon

On the fall of communism, right-wing political organisations were keen to destroy the statue but some of the factory’s left-leaning workers removed and hid the statue. It was rediscovered several years later in the basement of a marzipan factory and rescued to remind onlookers of the rise and fall of the communist movement. Elsewhere in the park, a small museum included training films showing the recruitment and surveillance of Hungarian secret police.

Lasting appreciation

The weekend over, a final treat for Linda and me was a surprise lift back to the airport from Beni in his 1990 Trabant. This gave the ideal Cold War closing touch to a fabulous weekend spent in stimulating company.

Great thanks are due to all who helped on the weekend – particularly Linda Dixon and Tony Radstone, all who suggested possible sites, and of course the great help we got from Beni and Dominik Burgess.

Photos by Clive Penfold unless otherwise indicated.



National Association of Mining History Organisations (NAMHO) Annual General Conference, 2018

Tim Wellburn



Blakeney Hill stone quarry: Lower Level, looking towards Strike Level

The Forest of Dean and the Free Miner

Geologically, the Forest of Dean is a natural basin. At its centre are carboniferous shales and sandstones with coal seams. Older carboniferous limestones, bearing iron ores leached down from the coal measures, underlie these, outcropping around the rim of the basin.

A remote and singular place, the Forest has a long history of coal and iron mining shaped – indeed, governed – by the unique position of the “Free Miner”. This ancient title refers to miners in the Royal Forest who have the exclusive right to mine personal plots, known as “gales”. Granted by Edward I (r. 1272–1307), the right applies to those born and abiding in the Hundred of Saint Briavels who have worked a year and a day in a coal or iron mine.

15th-century brass depicting a Forest miner: the original is in Newland Church



A Free Miners' Law Court sat in Speech House from 1682, presided over by the Deputy Gaveller (an extant role). The Free Miners' statutory position was affirmed in The Dean Forest (Mines) Act, 1838, and the Forest was duly exempted from the nationalisation of the UK coal industry in 1946. As in other mining districts, the growing 19th-century industrial economy and Victorian technology had brought much larger-scale mining, together with a network of railway lines in an area hitherto almost devoid of roads.

The last of the big gales closed in 1965 and, aided by a regulation requiring all surface works to be removed on cessation of mining, nature has now largely reclaimed the Forest. Only a handful of Free Miners remain active in small-scale workings in the margins of former mines – we would visit two such coal mines over the weekend – but the ancient traditions are proudly upheld.

Friday afternoon: Old Ham Iron Mine

As our 'opener' for NAMHO 2018, we had selected a Friday afternoon visit to Old Ham iron mine, one of the six inter-connected gales of the Clearwell group. Some 200,000 tons of iron ore were extracted from these mines in the period from 1832 to 1880. Last worked in 1936, Old Ham defied our expectations, rather tested our stamina and literally coloured the rest of our visit.

The trip provided the opportunity to see in-situ plate rail within the Lambsquay Gale. The notes remarked: "Access to the plate rail section is sticky, through some broken ground, small in places." From this we belatedly deduced that our guide, John Hine – known to all, for good reason, as "Mole" – was capable of understatement. For instance, the "small in places" proved to be a 10ft-long elbow-crawl through an 18-inch-square hole. However, the promised plate rail awaited us beyond this, so the effort was rewarded.

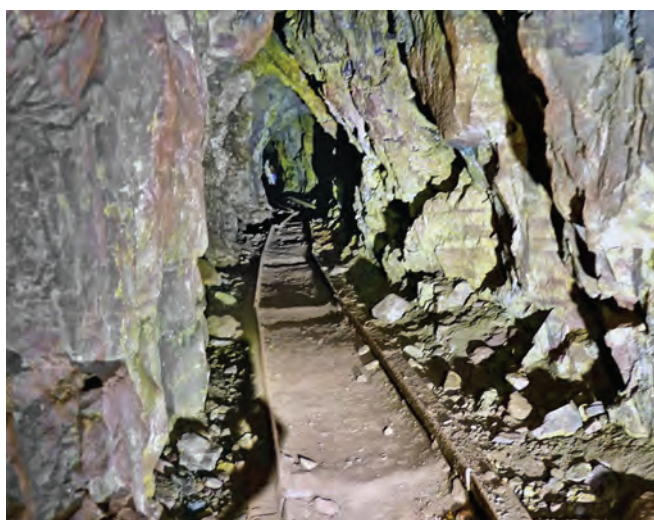


Plate rail in Lambsquay Gale

While Mole did warn us that the mine was unlike other iron mines, he did not say that we were about to enter a three-dimensional labyrinth. Clearly, the "Old Men" had followed the ore veins and the existing cave system with the maximum of extractive economy and our route

constantly twisted, turned, climbed or descended, with Mole leading our small group at a cracking pace past numerous competing passages and openings in every direction that all looked remarkably similar. We quickly found it impossible to maintain a mental map of our route.



*Old Ham: Descending into one of the larger chambers.
Photo Clive Penfold*

Had time allowed, after renegotiating our elbow-crawl, we would have returned via the "White Cross" route in which some residual cave features are visible, but our progress had been too slow for this and we could not be late for the NAMHO welcoming evening with the prospect of beer and fish & chips. We emerged, recalibrating personal perceptions of our fitness levels, and admired the distinctive red-brown colouration we had all acquired. This, we were to find, was ubiquitous underground in the Forest.

Friday evening: the Conference opens

The 'formal' opening of the Conference followed the fish & chips – although as is usual with NAMHO, this was a very relaxed and jolly affair, with the beer continuing to flow. The Conference chairman, David Hardwick, donned a bowler hat – not, I think, usual Forest attire – to deliver a fascinating talk on the history of Free Mining.

This explained much, including the miner's "nelly" (a ball of clay attached to a stick and a candle, the former gripped in the mouth and the latter held to one side of the miner's face: there was too little headroom for hat-mounted candles). The welcome pack kindly included a nelly and a candle for us to practise with at home.

The increasingly convoluted patterns of Forest landholding were also explained. These slowly fragmented and eroded the Royal Forest as kings made or revoked land grants to monastic orders and favourites, with the peasantry ever encroaching on the margins. I wish I could remember the half of it. This was followed by a couple of slightly bizarre 1970s amateur documentaries, interviewing first a group of old Free Miners and then, for some reason, a sheep farmer. After a long day, the latter's dialect proved too much of a struggle and we retired to our pub B&B for a final beer.



Mr Holder and his son, holding their nellies upside down, c.1850. Photo Clive Penfold

The more academic side of the Conference proceedings would continue through the weekend with papers delivered on or around its theme of *Mines, Mining and Miners of the Forest of Dean – A law unto themselves*. However, as usual, we had elected for the parallel programme of underground visits.

Saturday morning: Morse's Level & Wallsend Drift Coal Mines

By way of contrast to Friday's iron ore, on Saturday morning we went in search of coal, visiting two mines, Morse's Level No.3 and Wallsend Drift, both by courtesy of the same group of Free Miners. These mines were once part of extensive workings which produced, inter alia, steam coal. We could have made use of some of this later in the weekend...



Morse's Level No.3

Access to Morse's Level was via an elegant stone portal to a gently sloping 10ft-wide stone-lined adit laid with a haulage tramway. This ran under the adjacent road, with only a relatively shallow overburden, into higher ground. Thereafter it was rock cut. Some way in, the route divided – vertically – the rails heading off into the flooded lower level, in which stood a ladder that, in drier times, gave easy access to the higher passage.

Only one of us had come equipped with self-draining wellies, so the rest of the party elected for a bit of a clamber up and around the wooden supports to continue

our progress. Water has always been a problem in the Forest of Dean because of the peculiar local geology, and our guide told us that once it started rising they exited the mine as quickly as possible.

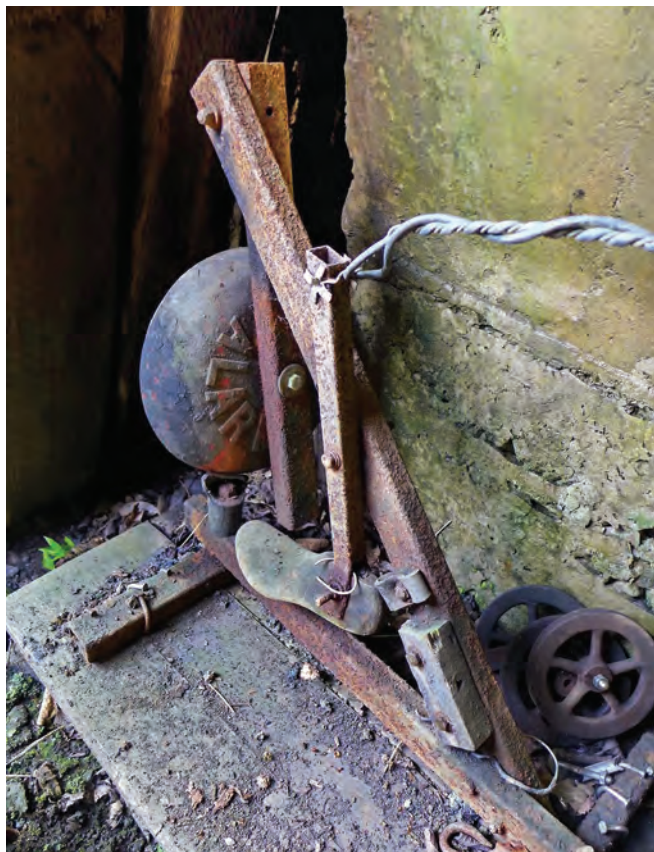


Morse's level: the vertical bifurcation of levels

A small side passage, accessible by a head-first descent through mud, led to a working seam (currently, the mine is worked only on a care and maintenance basis). I think it is fair to say that the very low, cramped working conditions here would not be tolerated by any employee or employer – but Free Miners are made of stouter stuff. Running below the access passage was an old, beautifully built stone-lined drainage adit, perhaps 18" wide by 30" high. How this was constructed remains a matter of wonder. A second adit, heavily timber-propped, but ascending to daylight, served as the mine's emergency exit. At the extremity of our visit was a recovered, if rather eroded, haulage dram and a rare underground furnace, with uncut coal forming part of its flue...



Morse's Level: the recovered dram. Photo Clive Penfold



Wallsend Drift: Main adit signalling

Wallsend Drift, by contrast, was in active production, with some bagged Forest of Dean Lump Coal awaiting transport to market. The somewhat ‘Heath Robinson’ compressed-air-driven screen was demonstrated to us: lacking venture capital, everything used by Free Miners needs to be begged, borrowed or improvised.



Wallsend Drift: the main haulage adit, looking to surface.

Photo Clive Penfold

The access to Wallsend was even more substantial: a large adit, initially concrete and subsequently stone- and brick-lined. This ran straight down into the mine on a reasonable slope and had been dug out by the Free Miners, although seemingly not to the prior floor level. Originally double-tracked, a single set of rather rickety rails now sufficed. It had once continued much further into the old mine, but the onward way was blocked.

At the bottom, initial stone arching to the left gave access to a heavily timber-shored drift. This continued as a new, much smaller, stone and wood-lined haulage adit, cleared through rather wet old ground to reach an extant coal seam. The tramway laid here now occupied the full width of the passage, with very little headroom. It was certainly the tightest haulage adit I have ever seen. We negotiated this, one at a time, to inspect the coal face before returning to the surface to reflect on a fascinating duo of visits which had imbued us with considerable respect for the modern-day Free Miner.



Wallsend Drift: the new haulage adit to the working face

Saturday afternoon: Devil’s Chapel

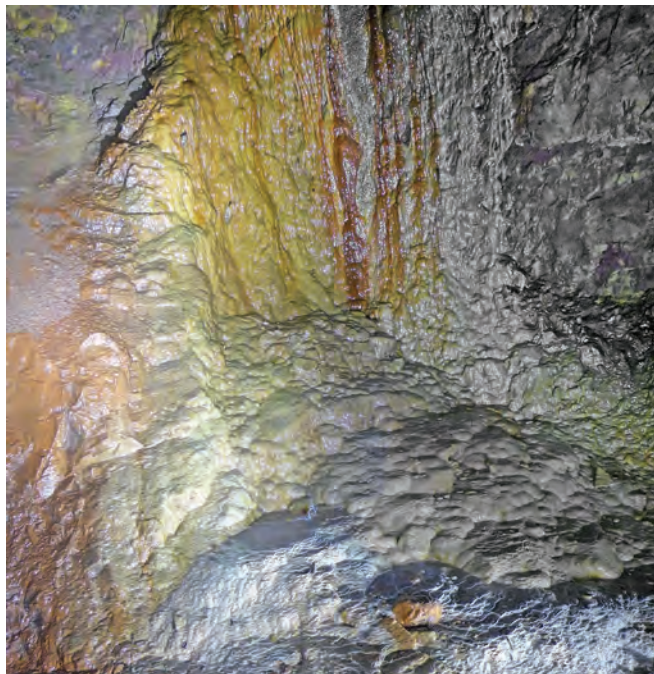
Devil’s Chapel was one of the iron mines excavated in an area of “scowles”, or naturally occurring pits and cavities along the carboniferous limestone outcrops. Its name probably comes from the Devil’s Ditch, an impressively long, narrow and deep (150ft) rift. The iron ore occurs both as hard layers of haematite and pure goethite (known locally as “brush ore”), which is softer and found within cavities in the limestone.

The extensive workings in this area may date back – appropriately – to the Iron Age. A line of shafts runs for almost a mile along the outcrop and the mines were certainly worked during the second half of the nineteenth century, with a total output of 83,000 tons during this period, although most mining had ceased by 1885.

We entered through something like a large badger hole at the end of a scowle, almost immediately descending



vertically, first through a cleft and then down a rock stack into a cave-like system of rough-hewn chambers, passages and cavities. Both types of ore were evident, the reds and purples of the rock dappled with the yellow of hydrated ferric oxide. A wet shaft overhead was creating flowstone and patterns of rimstone dams. An errant bean-sized seed, precociously germinated, was slowly being converted into an aspirant stalagmite.



Devil's Chapel: spot the bean shoot

The mine was not without larger scale theatre: at one point it appeared that successive levels of working had broken through into each other (or the miners had broken into a goethite cavity) leaving a rock arch on which, with a bit of a scramble, it was possible to strike poses for the paparazzi below.

We emerged from a different (steep) exit, which became progressively muddier as each departing wellie churned through the covering of leaf mould. With limited time (and energy) left, we decided to inspect the scowles, rather than negotiate a second, similar, mine. These wild, damp and verdant fissured rock gullies are the stuff of Gothic fantasy. Having lain undisturbed for so long, they are now rich in flora and fauna, and a worthy object of conservation.

Saturday evening: a Fiddle in the Clearwell Caves

A fiddle, at least in the Forest of Dean, is a celebration. This one was to be held in the Clearwell Caves, an extensive natural cave system that has been mined for iron ore and pigments from time immemorial. It was opened to the public in 1968 by the late Ray Wright, a Free Miner and Forest luminary, as a working museum: ochre is still mined here for artists' pigments.

The Caves are now run by his son Jonathan, by whose kind permission the Conference delegates gathered in one of the vast chambers to enjoy a magnificent wild



Devil's Chapel: The rock arch

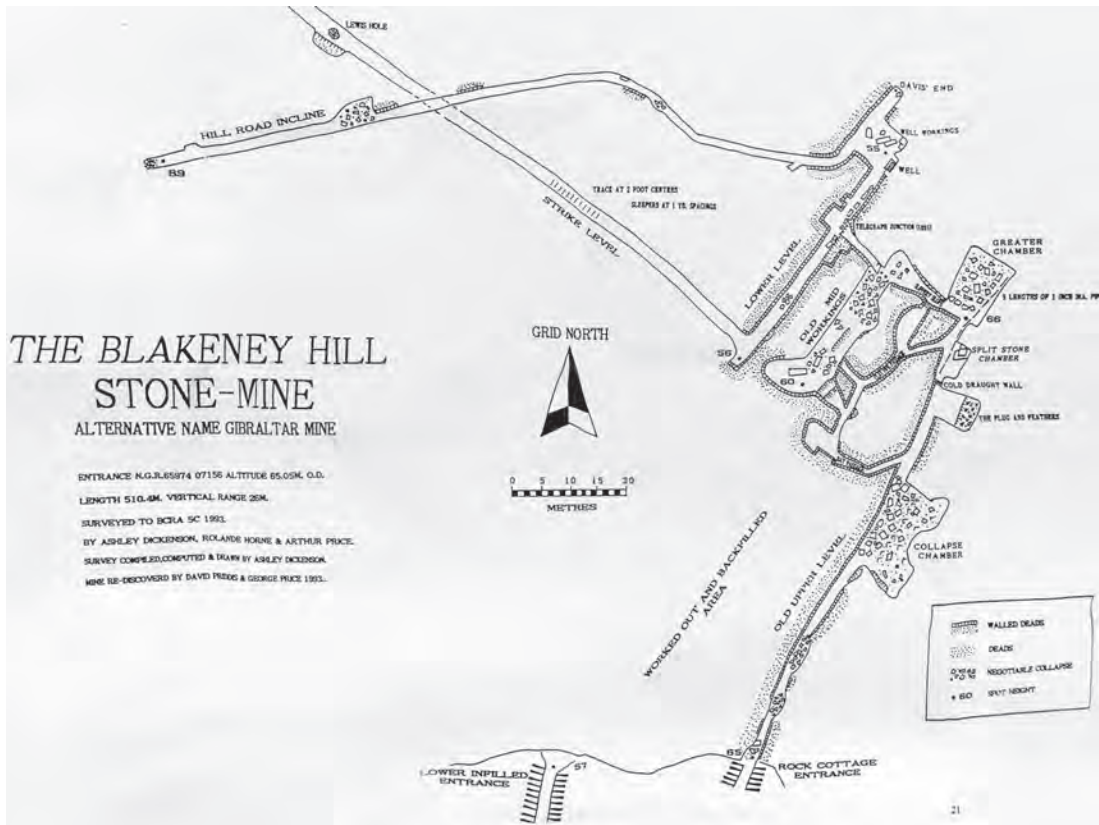
boar roast, music and a great deal of ale and cheerful conversation. Some SubBritters may fondly recall the splendid DeKeel Quarry 'picnic' under the Belgian/Dutch border in May 2010 (*Subterranea* 24, p.45), but this entertainment was on quite a different scale.



Clearwell Caves: the Fiddle. Photo Clive Penfold

Sunday morning: Blakeney Hill Stone Quarry

Also known as "Gibraltar Mine", Blakeney Hill Stone Quarry is something of a parvenu, having opened only about 1890 – and was worked out by 1929. Mainly owned and worked by local people, it was, however, the longest stone mine in the Forest. The silver-grey stone was used for "ornamental" purposes such as gravestones.



Blakeney Hill Stone Quarry: 1993 Survey Plan

A relatively small mine, it nonetheless managed to acquire four entrances, although only one of these (Rock Cottage) is still accessible. This is now a squeeze, but once inside we were able to enjoy the luxury of the headroom provided by a stone quarry, with only one significant collapse and a 6ft “cold draught wall” presenting any challenge to our post-fiddle coordination and onward progress.



Blakeney Hill: SubBritters negotiating the Cold Draught Wall in Old Upper Level, viewed from Split Stone Chamber
 At the far end of Old Upper Level, along which sleeper impressions were still evident, we descended, skirting the Old Mid Workings where the roof is in a parlous state, to reach the Lower Level with its high walls of neatly stacked deads and a number of tall timber roof props, some with chains attached.



Blakeney Hill: Strike Level

Sunday afternoon: Robin Hood Iron Mine

And now for something rather different: a 212ft descent of Robin Hood shaft by courtesy of Paul Thorne, his immaculately engineered winch and supporting team of Robin Albert, Matt Clarke and Nick Green. The shaft was sunk through Drybrook Sandstone and Whitehead Limestone into the Crease Limestone. It is brick-lined and retains its haulage timberwork.

Robin Hood mine was first worked in 1826, although the period of peak production of haematite and red ochre was much later, between 1885 and 1927. An 1885 drainage and exploration adit was driven 1,180 yards, to within 12 yards of Robin Hood Mine, but never connected. The mine was reopened by the Ministry of Supply from 1940–44, with Canadian sappers driving some (exploratory?) headings.

From here we were able to access both the rough-hewn ascending Hill Road Incline to its back-filled end, and also Strike Level. The latter heads off at right angles: the blocked way straight ahead almost certainly led to the Lower Entrance before this area was worked out and back-filled. Strike Level is a bit of a mystery: a substantial rock-cut drift, clearly once laid with a substantial tramway: it seemed a very substantial investment for yet another haulage adit.

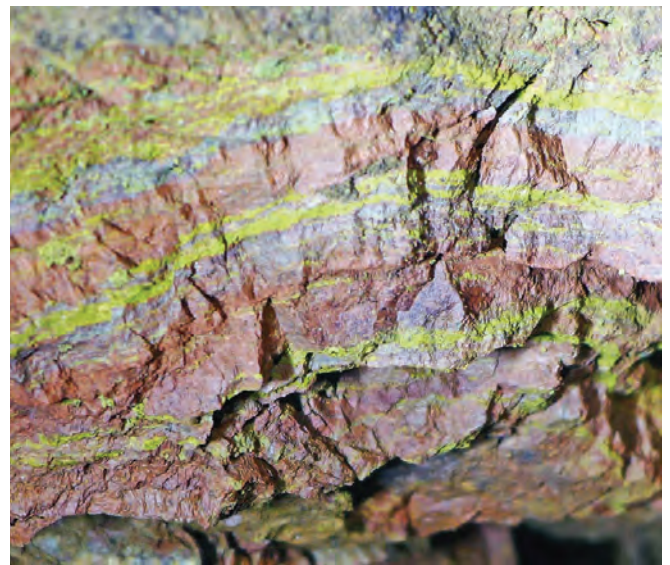


*Robin Hood Mine: Paul Thorne at the controls of his winch.
Photo Clive Penfold*

Once landed at the foot of the shaft and disengaged from the safety line, we were free to explore the mine at will. The accessible area is now effectively constrained by a number of collapses, including one at the head of a steep incline leading SW to an adjacent air shaft. An extensive area of rather tortuous and interconnected old up-dip workings lie alongside the main drift and it was possible to wander round these, sure in the knowledge of eventually re-emerging on either the drift or incline. At the northern end of the latter was a large chamber with strata displaying the full spectrum of red, purple and yellow ochre.



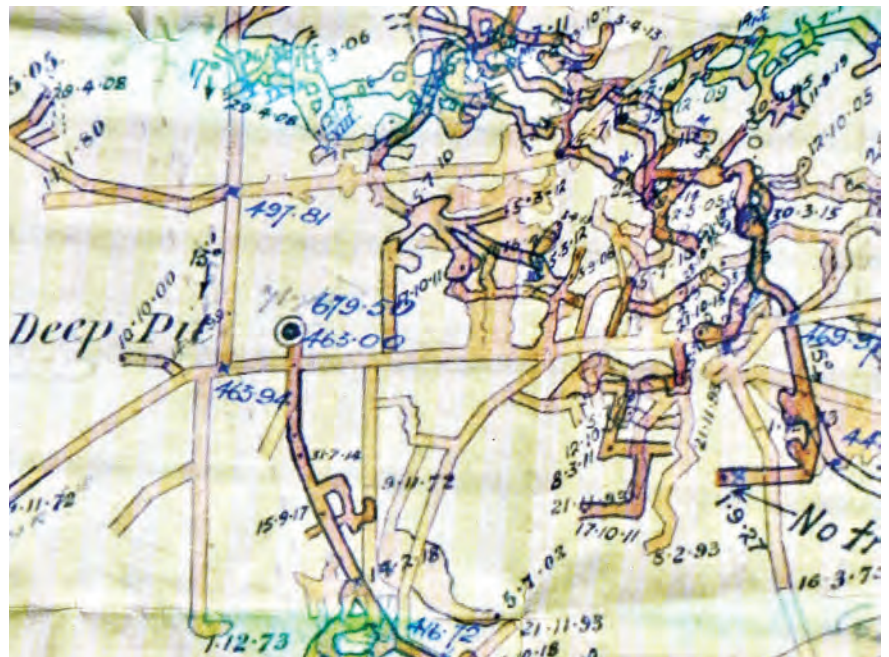
Robin Hood Shaft with haulage timberwork



Robin Hood: An artist's palette of ochre (ferric oxide)



Robin Hood Mine: Robin Albert about to despatch Richard West



Robin Hood Mine: Survey Plan showing the approximate area we visited



Sunday evening: the Dean Forest Railway

With the northern terminus of the Dean Forest Railway literally across the road from the Conference venue, it would have been rude to ignore it, and the organisers had duly arranged a 'Special' for us. This proved even more interesting than expected. Great Western Railway locomotives run best on Welsh steam coal. Prairie Tank 5541 [1], resplendent in pristine early British Railways livery, clearly would not countenance the slack that was all that remained in her bunker.



Dean Forest Railway: the NAMHO Special acquires double-heading

This fact became apparent after a much delayed departure and our halting progress while the fireman did what he could to obtain a viable head of steam. With the help of the prevailing downhill gradient we eventually reached Lydney Junction, but it was clear that the climb back to Parkend would not be achieved under steam power. A short way out of Lydney we halted again for Crewe-built diesel shunter D3837 to be attached (oh! the ignominy) and from there we ran double-headed – an unusual sight on the railway. Maybe Wallsend Drift mine could acquire a new customer...

Monday postscript: Windrush Stone Quarry

To ease our underground withdrawal symptoms, NAMHO had twisted Jann Padley's arm to lead a Cotswold stone mine visit on our way home. While he had a plan of this quarry (or, rather, two plans, which didn't quite match up), very little appears to be known of the history.

Numerous wall grooves, wheel ruts and even horseshoe impressions in the floor provided clear evidence about haulage. There were also wall graffiti and smoke markings on the roof and several

(nondescript) clay pipe bowls to examine. Other underground features included some fine stone walling and archways and a very well-preserved stone trough carved in the floor.



*Windrush: The author examines the fine stonework.
Photo Richard West*

Navigation was not altogether straightforward: numerous passages branched off into working areas and it was sometimes difficult to determine which was the main haulage route. Quite early on there was a short crawl through a slot, bypassing a fall in the main drift, and elsewhere the structural integrity of the roof might have been questioned by an actuary.



Windrush Quarry: Recording roof graffiti, rather than structural integrity

Having reached the extremity of the accessible workings, we returned by the same route and made ourselves as respectable as possible (having liberally overlaid the red hues acquired in the Forest of Dean with Cotswold yellow mud) in order to lunch, as a group, at an adjacent riverside pub. A fine conclusion to another excellent NAMHO Conference.

And so to 2019...

NAMHO 2018 continued the tradition of welcome and friendliness which are one of the abiding memories of these Conferences. The organisers had clearly invested a vast amount of effort in delivering the event, and many people, including Free Miners, willingly gave their time to lead the underground visits. Old acquaintanceships were cheerfully renewed and new friends made. Some ten SubBritters attended, above and below ground.

Next year's Conference is being organised by the Cambrian Mines Trust (the inimitable Roy Fellows, in conjunction with Dr Peter Cloughton as lecture programme organiser) at Llanafan, Ceredigion, from 4 to 8 July 2019. Mining types will recognise the proximity of this venue to Cymystwyth, arguably one of the most important historical mining areas in Wales. It promises much fascinating underground exploration

Sources

NAMHO: Conference Delegate Notes, 2018
Gloucestershire CC Archaeological Service:
Scowles in the Forest of Dean, 2014
Clearwell Caves: www.clearwellcaves.co.uk
Dean Forest Railway: www.dfr.co.uk
Wikipedia

Rail Footnote

[1] GWR 5541 is a small Prairie Tank (2-6-2T), one of the 4575 Class built by Collett in Swindon in 1928. Retired from service in 1962, she was restored at Parkend in the 1970s after a decade at Woodham's scrapyards in Barry.



And so to the next time...

Photos by the author unless otherwise stated.

I counted them all out.....

Martin Dixon

Following a recent incident where visitors were locked in at a site (not on an official Sub Brit trip), it's worth reiterating an aspect of best practice when exploring underground.

Organisers should always ensure that there is a system in place to ensure all attendees have exited a site before it is secured. There is no single system – it's a question of making sure that the one chosen is appropriate, effective and communicated.

The three main approaches are:

- 1) Do a headcount before entering and after exiting to ensure everyone is accounted for. This is particularly effective if the attendees are travelling onwards together as a group.
- 2) Individual sign-in and sign-out – either by individuals or by a co-ordinator. As an alternative to a sign-in sheet, a tally board can be used.

For both these options it is important to secure the entrance (especially in a populated area) to prevent other people wandering in. We all know how tempting an open door can be!

- 3) Conduct a search of the site after the visit to ensure that no one remains inside.

In all three cases, it is important to brief attendees as to their responsibilities. If a site visit is 'freeflow' rather than guided, then a time when everyone should have left and the site will be locked should be clearly announced.

The larger the group, and the larger the site, the more important it becomes to have a robust system in place. What is appropriate for an extensive abandoned mine is overkill for a small air-raid shelter. A visit by four people has very different dynamics to 104. At a public/museum site the responsibility usually falls upon the site owner.

Finally, if as an attendee you feel that someone is missing or that appropriate processes aren't being employed, let the organiser(s) know without delay. Underground spaces have notoriously poor mobile phone signals and many places we visit are pretty remote so our motto must always be 'better safe than sorry'.

For more health and safety recommendations a guide can be viewed at www.subbrit.org.uk/about#documents.



Waddon & Beddington Caves

Waddon Caves, London Borough of Croydon

Paul W. Sowan



The entrance to the Beddington tunnels in September 1993.

This original entrance on the east side of Plough Lane was excavated by Sutton Council contractors. Photo Nick Catford

Four man-made ‘caves’ dug in the Thanet Sand at Waddon, a district lying west of the town centre at Croydon, were investigated and recorded during the twentieth century, and the possible presence of a fifth one suggested. The first three came to light in June 1902 when a trench for a new sewer was being dug across what had been the lawn of a now-demolished mansion, Waddon House. The site was then being developed as what is now Alton Road.

On 13 October 1953 the collapse of the front garden at 41 Alton Road revealed a fourth ‘cave’ very close to those already known. All four investigations were recorded and published by the Croydon Natural History and Scientific Society.

Caves 1 – 3

In June 1902 a row of three closely spaced rock-cut chambers was discovered during the digging of a trench for a new sewer across what had been a lawn at Waddon

House. These ‘Waddon Caves’, clearly man-made rather than natural, had been dug into the bed of Thanet Sand which outcrops across central Croydon from Waddon to Addington. They were investigated by antiquarian George Clinch, and reported on at a meeting of the Croydon Natural History and Scientific Society held on 21 October the same year.

Clinch reported that the chambers were up to seven feet high from floor to ceiling, and up to 12 feet in diameter. They had originally been accessed from a sunken pathway excavated into the sand. The chambers were partially filled, and the pathway wholly filled, by loose sand and soil. Careful examination revealed some worked flints, possibly Romano-British pottery, and fragments of animal bones.

To what extent the pottery and bone had been brought in by those who excavated the chambers rather than washed in subsequently with the infilling sand and soil

was discussed. Clinch speculated at length on the original date and purpose of the ‘caves’, citing similar excavations recorded in France and Portugal. Although no human bone was recorded, he suggested they may have been created as Neolithic burial chambers.

Cave 4

This fourth very similar ‘cave’ at Waddon very close to the three found in 1902 came to light on 13 October 1953, when land in the front garden of 41 Alton Road fell in after a night of exceptionally heavy rain. This was examined by A.B.L. Reid of the Croydon NHSS. The cave floor was seen to lie about 15 feet below ground level.

This cave was found to be 10 feet nine inches north to south, and 10 feet six inches east to west, with a floor to ceiling height of about seven feet. Three distinct layers of infilling material were examined, the lowest of which contained fragments of Iron Age (pre-Roman) pottery. Nothing was found to support the 1902 identification of the cave as a ‘Neolithic burial chamber’.

A possible Cave 5?

The 1953 report noted that ‘probe examination of the walls of the 1953 cave suggested the presence of a fifth example distant only 40 inches through the hard sand wall’ although no further discovery appears to have

been reported. All four recorded caves were evidently backfilled within weeks of discovery to avoid further subsidence as a hazard to property.

Thanet sand ‘caves’ in the district

The Thanet Sand stratum outcrops throughout north Kent and much of north Surrey. This was clearly a stratum in which self-supporting chambers and tunnels were easily dug. Nearby at Plough Lane, Beddington, a small complex of tunnels (now bricked up) has been well recorded, but is of unknown date or original purpose, although as there seem to be no earlier records a nineteenth-century date has been suggested, perhaps as purpose-made cellars for the adjoining *Plough* public house.

There are numerous suggestions of caves and tunnels in the Thanet Sand in the Coombe and Addington areas, at least some of which almost certainly exist. There are numerous other known examples from Kent and Surrey. Whether the Waddon Caves are genuinely of Iron Age date, or much more modern excavations into which surface soils containing ancient pottery has fallen or been washed, is not clear.

Alton Road was presumably so named from the Crowley family’s brewery at that place. Philip Crowley’s mansion Waddon House stood nearby, and Alton Road appears to have been built on his estate.

Beddington Caves, London Borough of Sutton

Paul W Sowan & Malcolm H Tadd (with additional notes by Nick Catford)

History

The earliest date that can be assigned to the Beddington tunnels (often referred to as Beddington caves) with any confidence is early 1830s, if one takes at face value the following description from the first edition of the *Half Holiday Handbook – Croydon to the North Downs*, published in 1881:

“Nearly half a century ago, a party from Croydon, including some members of my family, explored its dark and chill recesses for a considerable distance; but returned to daylight and fresh air on one of their candles being extinguished in a foolish frolic. There is a gradual descent from the mouth, and water is said to exist in a remote part of the cave; but I am not aware that the subterranean pool has ever been seen or that the extremity of the long passage has ever been reached.”

The earliest indisputable evidence for the existence of the tunnels is the first edition of the OS 6” plan surveyed 1866/7 which shows the ‘cave’ but also a long ‘subterranean passage’ running to the far side of the railway cutting to the south. The first edition OS 25” plan surveyed in 1894 gives a reasonably accurate survey of the two entrances, the tunnels immediately inside, and the air-shaft.

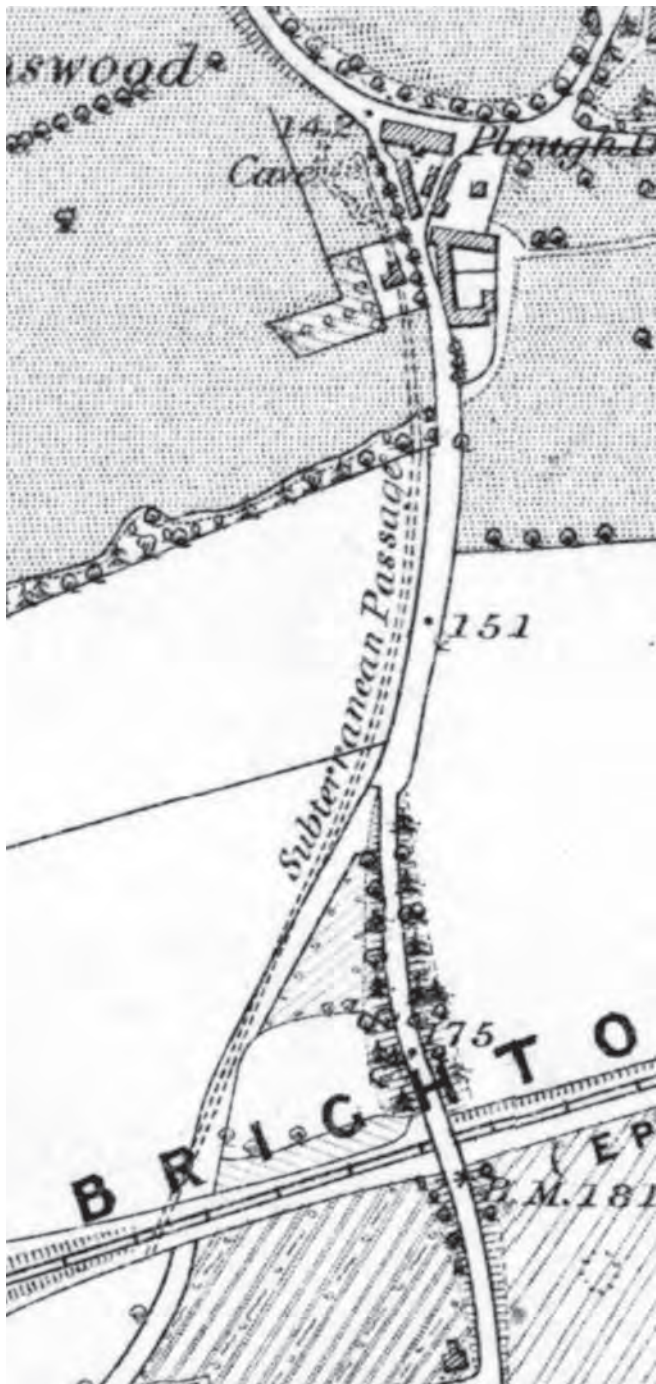
It is with some diffidence, in view of this accuracy, that one questions the long ‘Subterranean Passage’ shown running southwards parallel with Plough Lane, thence Sandy Lane (now Plough Lane Close), and terminating under the far side of the railway. This is repeated in the second edition 25” plan (1911) reproduced here, but, in this edition the tunnel stops at the railway cutting.

The first description in print, very brief, is that of Alfred Smee in a curious book titled *My Garden*, published 1872. Edward Walford’s *Greater London: A Narrative of its History, its People and its Places* published in 1884 describes:

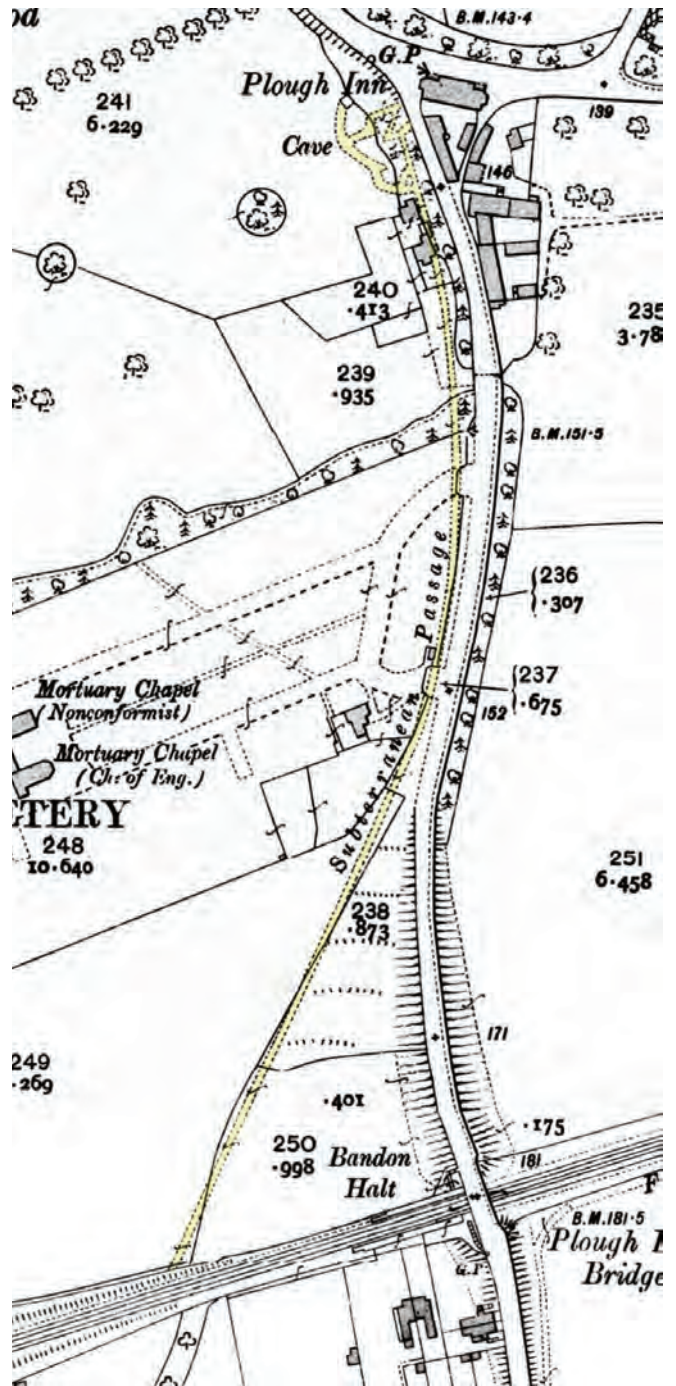
One entrance to this underground system used to be visible just to the west of the inn where Beddington Cave stood exposed in the face of a high perpendicular bank, formed by cutting through the sandy slope when the lane was made. The cave’s extent is unknown. There is a gradual descent from the mouth, and water is said to exist in a remote part of the cave; but it is not on record that the subterranean pool has ever been seen, or that the extremity of the long passage has ever been reached.

Walford recorded the vague, but not improbable, statement that ‘it was once the secret resort of robbers and the repository of their plunder’.





1866/7 OS 6" plan



1894 OS 25" plan

There is a good deal of interesting negative evidence. Whereas holes and tunnels almost invariably get some sort of a mention in 18th- and 19th-century topographies, I can find no earlier references to Beddington Tunnel. And the very detailed descriptions and large-scale plans of the Sale Particulars for the Beddington Park Estates, in 1859, make no mention: however, this may be because Lot 10 (containing the entrances) was offered for sale as 'particularly desirable for building purposes'. Enclosure and Tithe maps and schedules of 1812, 1840 and 1860 are equally silent.

In about 1936/7, contractors were employed on the construction of the last eight shops of a new parade facing the *Plough Inn* on the opposite side of Plough Lane from the cave entrance. They had instructions to go down 10

feet, for the foundations, and in doing they broke through into a brick-lined tunnel or tunnels in various places. However, no one apparently went through to investigate this find, or even reported it to anyone who might be interested: they just filled up the holes with hardcore and built on top! This is the first report of a tunnel on the east side of Plough Lane.

Geology

The first obvious point to be noticed is that, according to the 6" geological survey maps, the tunnel runs out of the outcrop of Thanet Sand, if it runs where the OS plan indicates it to run. The geological survey map is not entirely accurate, but examination of Plough Lane Close seems to me to indicate that if the tunnel really does run just below it, it must be excavated in the chalk.





Beddington Caves in 1968. Photo Norman Langridge

Thus there is no question of it intersecting the railway cutting, as (a) it is not shown heading for the cutting; and (b) if the map is to be believed, the tunnel is lower down, in the chalk, anyway.

This is not impossible. On the other hand, I have never heard it suggested that the tunnel is excavated in anything other than Thanet Sand. Any evidence for excavated chalk inside the tunnel would be most interesting.



Beddington Caves in 1968. Photo Norman Langridge

If the tunnel is restricted (as seems likely to me) to the Thanet Sand, then the results of five trial borings on the site of the Bandon Hill Cemetery are of interest. A maximum of 39' of sand above the chalk was proved, and a mere 17' indicated some distance inside the south gate. So if the tunnel ran as shown, it had remarkably little vertical leeway, which was diminishing progressively southwards.

The railway cutting exposed 20' of sand at its deepest part, and I suspect this is almost the total thickness this far south. The Thanet Sand thins to almost nothing in another 800' southwards.

If the tunnel ran as shown, within the sand, it should rise at about 1 in 16, which hardly squares with the *Half Holiday Handbook* account of a gradual descent! Any information anybody can provide on levels and inclinations of passages would be worth having.

By far the most obvious line for excavations is directly into the hill, where a maximum thickness of 60' of Thanet Sand probably exists under the small remnant of Woolwich & Reading Beds on the former site of Queenswood. Such a line appears to be supported by an excursion report by TKF Page, published in 1905:

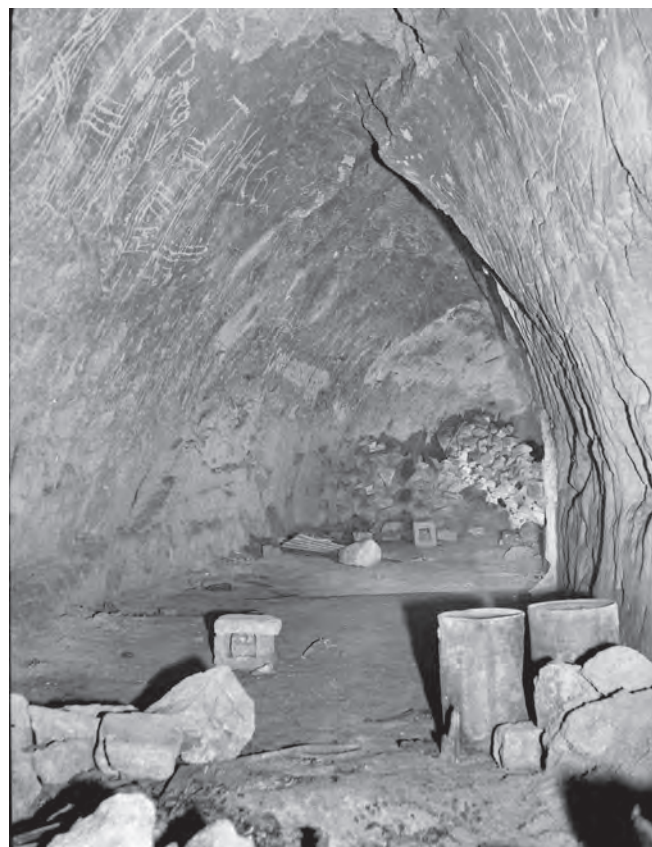
Saturday May 14th. The larger of the two caves consists of a tunnel some ten feet or so in diameter, whose main branch runs some three hundred feet into the hill.

Hydrology

Joseph Lucas, in his interesting book *Horizontal Wells* (1874), comments that,

From Carshalton eastwards, as far as Croydon, spring various sources of the Wandle; and, demonstrating the complete saturation of the chalk in that locality, the river at Waddon flows upon chalk for half a mile.

And Alfred Smee, on making borings in his garden (the Grange, now forming the western end of Beddington Park) discovered that he had created an artesian well, with water rising up to two feet above the ground surface (W. Whitaker, *The Water Supply of Surrey*, 1912).



Beddington Caves in 1968. Photo Norman Langridge

If Beddington Tunnel went to Croydon Palace, it would appear that it ran straight underneath the springs which feed Waddon ponds. Even to reach the cellars of Carew Manor, I imagine there would be problems with water, as the tunnel would appear to have to go through the river gravels of the flood plain, or the saturated chalk or sand below them.

If we are to have a tunnel to the manor at all, I can only really imagine one being likely running more or less underneath Brandries, northwards, and emerging in the low 'river cliff' of Thanet Sand immediately north of Church Lane, well above water level and, one assumes, at least safely inside the then grounds of the manor. It would be quite a steeply dipping passage, about 1,900 feet in length. However, I rather doubt if even that exists! A more direct line to Carew Manor, ie northwesterly, might have been taken, at a shallower dip. But Jesse Clack & Sons' brickyard immediately north of Sandyhill excavated almost the entire depth of the Thanet Sand for the manufacture of sandlime bricks, and although an old well was discovered, penetrating into the chalk, no trace is reported of any tunnels. The headings reported in *More Secret Tunnels* are the remains of tunnels made by Clack & Sons to facilitate investigation of the well, as described by GW Moore, and CC Fagg & DJ Clack. In the 1930s a new residential development called Iberian Avenue was built to the west of Plough Lane with the rear gardens above the tunnels. WH Yeoman describes attempts to block the tunnels in May 1932, on account of the development of housing above them. This was done 'by order of the estate agents'.

Tunnel visits

Visits to the tunnels are recorded in 1872 (Alfred Smee), in 1881 by a guide book, by the Croydon Natural History and Scientific Society in 1905, by the Geologists' Association in 1913 and by the CNHSS once again in 1914. This last trip was important as the record implies that CC Fagg intended to dig in search of the long passage to the railway cutting which was not therefore visible at the time. Unfortunately Ordnance Survey relevant documentation about the long tunnel was lost following enemy action during WWII.

When the London Speleological Society examined the tunnels in 1940, they concluded that they had probably been the result of sand mining. The group's investigations led them to the nearby Queen Elizabeth's Walk, where a manhole cover concealed an entrance to the caves, but they could not obtain permission to enter and explore more fully.

The records of the Wallington Archaeological Society (Volume 5, p77) describe a dig made by the society to try and locate the long tunnel at the railway line end. A trial trench was dug in ground which was then allotments but is now part of the cemetery. One of those involved in digging the trench was a Mr Poyner, the then Sutton Borough Engineer. Although this trench was unsuccessful

apparently Mr Poyner did succeed in getting into the tunnel in 1945. Unfortunately no other information is available.



HD Oakley's group of schoolfriends in the caves in 1958.

Photo HD Oakley

In 1959/60 the tunnels were entered by HD Oakley and a group of school friends. Oakley kept an exploration diary and the friends made a detailed survey of the accessible tunnels which is surprisingly accurate when compared with surveys made by later cavers. Between June 1959 and January 1960 Mr Oakley and his friends conducted a number of digs in the tunnels and opened another entrance. Their exploration diary can be seen at <https://tinyurl.com/yd7nmasc>. He also took five photographs.

Mr Oakley noted that in early June 1959 a large crater appeared in the front garden of a bungalow at 224 Croydon Road; this is on the opposite side of Croydon Road to *The Plough* pub. This fall appeared to be in line with one of the short tunnel stubs suggesting that at one time the tunnel might have extended under Croydon Road. Under the bungalow there was about 50ft of tunnel which was filled in by the Council.

Croydon Caving Club entered the galleries in 1966 and produced another survey. Chelsea Speleological Society also examined the system in 1968. Chelsea's Norman Langridge recalls going into the sand pit that abutted Queen Elizabeth's Walk and seeing the entrance to a tunnel part way up the wall of the sand pit's north side, but its location made it inaccessible. This pit has now been completely filled in, right up to the level of Queen Elizabeth's Walk, and houses built on it

Local resident Sue Chester recalls how she used to visit the tunnels: 'As for the tunnels, we stumbled across them by accident. When we were teenagers (mid-1960s to the early 1970s), we went exploring and found the entrance. If you go to *The Plough* public house and look across the road to where the back gardens of the houses come down to meet the road, there amongst the brambles is the entrance to one of the many tunnels. As teenagers, we used to go "down the hole", as that is what it was, just a hole, no bigger than a fox's hole. When we got inside,

it would open up into a bigger tunnel. Going further in, we found a large ‘hall’ which was big enough to have a small banquet. We used to play down there. Suddenly, they were bricked up. We later learnt that the Council had done this for safety reasons.’

David Bushell also remembers when it was possible to play in the tunnels: ‘Just after the war as youngsters – 11 to 12 years old – we used to play in the sandstone caves by *The Plough*. We would drop down a hole about the size of a manhole and enter a tunnel heading in the direction of Beddington Park.

‘After a few yards the end of the tunnel was bricked up but to the left was another tunnel sloping steeply downwards to another tunnel forming a T-junction. This tunnel was also bricked up on the right (again in the direction of Beddington Park), but to the left was quite a large cavern which would have reached under the road or perhaps *The Plough*. The cavern gradually tapered off to nothing. On the right of the cavern was yet another opening that appeared to go nowhere. It was believed that the bricked-up tunnels led to the church in Beddington Park. I can remember on one occasion, around November time, having a firework battle with a rival group of kids. There was so much smoke generated that we had to feel our way out of the caves! Highly dangerous, but we had just been through the war with all the bombing and doodlebugs (V-1s) and so it didn’t seem so bad!’

1993 attempt to enter the tunnels

During the summer of 1993, The Wealden Cave & Mine Society proposed to perform an accurate survey of the subterranean system producing a measured survey, photographs and a report on archaeological finds. However this was contingent on the system being opened up by the London Borough of Sutton Environmental Services.



Just inside the excavated entrance a short length of lined tunnel leading to a roof fall is seen to the left.

Photo Nick Catford

Investigatory work on the embankment in Plough Lane, opposite *The Plough*, by London Borough of Sutton’s contractors R.J.Dance during the week prior to 20 September, brought to light only one entrance to the

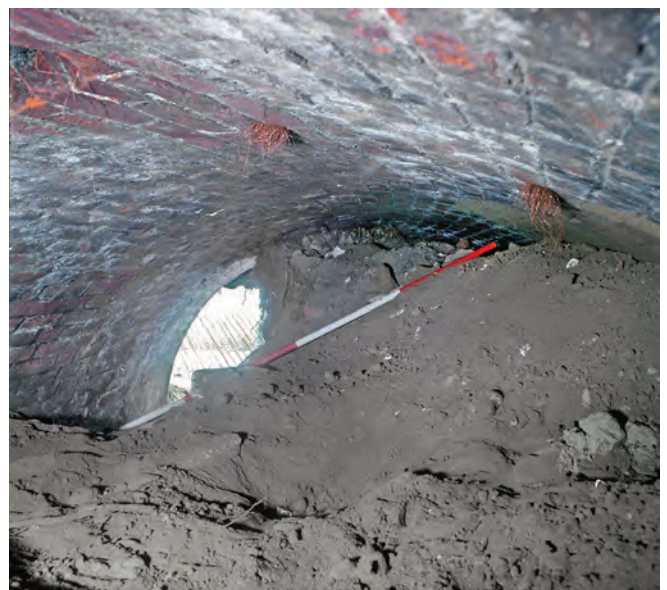


Looking west into the tunnel system from the entrance.

A route through the fill was dug in an attempt to get into open tunnel. Photo Nick Catford

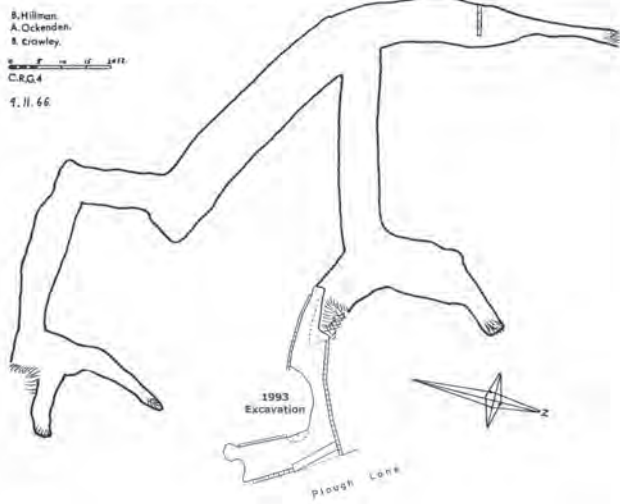
underground system which was a brick-lined tunnel. Using earth-moving machinery it proved possible to clear a substantial length of this tunnel of filling material but not far enough to penetrate the underground galleries.

On Monday September 20, under the supervision of London Borough of Sutton’s safety advisor, members of the Wealden Society tried to extend the tunnel. This was not successful since instability was encountered. This was assumed to have arisen as a result of an old roof fall which would have caused loose material to have fallen into the tunnel end. This is consistent with Croydon Caving Club’s plan. Further digging would have required a protracted exercise of shoring up and on the advice of the safety advisor the digging was terminated.



Looking out of the tunnel towards the entrance on Plough Lane. Photo Nick Catford

CSS Survey of Beddington Caves 1966



A plan of the 1993 dig superimposed on the CSS survey of the tunnels of 1966

Before concluding the project, measurements were made of the tunnel and surroundings, photographs were taken and an assessment made of the material filling the tunnel.

It was therefore not possible, as hoped, to produce accurate plans and photographs of the system. Nevertheless it was possible to draw an accurate plan locating the entrance tunnel in relation to the kerbside and the *Plough Inn*. A combination of this plan and one produced by Chelsea Speleology Society (reproduced here) in 1966 allows an approximate determination of the relationship between the subterranean system and the houses in Iberian Avenue to be made.

There have been several reports of craters appearing in the gardens of houses in Iberian Avenue. There are also word-of-mouth reports of people entering the system through such craters. The most recent collapse of the tunnels in the rear garden of 20 Iberian Avenue occurred on 1 October 2014. Two masonry walls were built in the tunnel either side of the collapse and the hole was backfilled with rubble. A previous collapse at the same address occurred in 1945.



Collapse of the tunnels in the rear garden of 20 Iberian Avenue in 2014.

Photos (above and right) from Checkel-Dalton Associates



The tunnel

As originally built, the tunnel, lined with a double thickness of bricks, would have constituted a comfortable walk-in entrance to the underground system. As observed during this exercise the brickwork was damaged both at its entrance and in parts of its roof. At the tunnel entrance there was a concrete bar in the floor 0.3 metres above kerb level. The tunnel was therefore at the base of a sand embankment five metres in height. The tunnel was filled with loose sand and blocks of chalk. Information from the Engineering Department, London Borough of Sutton, was that the tunnel was filled in 1981 when work was done on a sewer in Plough Lane. This accounts for the presence of the chalk in this Thanet Sand stratum.

What can be seen today

Once the tunnel had been back-filled and sealed with Thermalite blocks a few days after the excavation, a replica brick tunnel entrance with a locked gate was later built into the embankment but this is meaningless as no interpretation board has been provided.



Imitation tunnel entrance in Plough Lane seen in July 2018. Without any interpretation panel only local people will know what it represents.

Myths and legends

There has been a huge amount of speculation about why the tunnels were excavated and what they were used for and where the long tunnel was heading. The elderly verger at St Mary's Church, Beddington had numerous tales about the tunnels when spoken to by members of the Croydon Caving Club in 1972. He claimed to have often been in the tunnels many years earlier and said that they extended for well over half a mile. He also stated that when the railway cutting was excavated (the line was opened by the London, Brighton and South Coast Railway in 1847), it cut through one of the tunnels.

He went on to say that the tunnels had possibly connected to Carew Manor House, St Mary's Parish Church and a monastery in Queen Elizabeth's Walk, which runs parallel to the road by the *Plough* pub. Also he explained that there had at one time been a tunnel from the Beddington system to 'Jerusalem', a place in Carshalton, about two miles away. Local gossip has it that, at one time, a tunnel went from Beddington to the Old Palace in Croydon. The verger said that he believed them to be escape tunnels for monks, clergy or religious renegades during the religious purges of the Middle Ages and Tudor period. Further information can be found in the *Surrey Archaeological Chronicles* Vol.VII p.xxxvii which states: "At a distance of 200 or 300yds Mr Watney built a cottage for his gamekeeper and in digging the well the wellsinkers came upon a subterranean passage. A man named Ploughman penetrated along the passage for a considerable distance and he said he came to water. Near the Plough at Beddington there is an entrance to a similar, possibly the same, passage. Where it leads to is unknown but most probably towards Foxley Hatch and that it was the one which the wellsinkers came across. If so it must be at least 2 miles long."

The gamekeeper's cottage referred to is 41 Plough Lane and is now known as Well Cottage. The 220-foot well has a concrete cap so it has not been possible to confirm if the well shaft intersects the tunnel.

If you are in the area it is probably worth looking at the replica entrance in the embankment. Then cross the road for a drink in the *Plough* pub. Ask to see their cellar because their website proudly claims to have a tunnel in the cellar 'that leads to Carew Manor in Beddington Park which was frequently visited by Queen Elizabeth 1st and Sir Walter Raleigh whose head is buried in the churchyard of St Mary's Church!'



Beddington Caves in 1968. Photo Norman Langridge

Sources - Waddon caves

CLINCH, George, 1903, Recent discoveries at Waddon. *Proc. Croydon Natural History and Scientific Society* 5 (4), 40–48 + plate [Includes two photographs and a plan and section]

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FRERE, Sheppard, 1954, Pottery from subterranean chamber, Waddon. *Proc. Croydon Natural History and Scientific Society* 5 (4), 150–151 [Includes a drawing of pottery fragments]

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REID, Alan

Sources - Beddington Tunnels

Pelobates – journal of the Croydon Caving Club (various issues)

Cave & Quarry – journal of the Wealden Cave & Mine Society (various issues)

Chelsea Speleological Society Records, Volume 3 (1963) and Volume 5 (1968)

Croydon Natural History and Scientific Society newsletters (various)

Mysterious Mitcham (website)

Doug Cluett of Sutton Libraries local studies department (information about tunnels on the east side of Plough Lane)

Norman Langridge

Harry Pearman

Checkel-Dalton Associates



Tunnel Vision: Sub Brit goes underground on the Thames

Stewart Wild



Coffer dam under construction on the Victoria Embankment Foreshore

Most members will have heard by now of the Thames Tideway Tunnel project, a massive undertaking by supply and sewerage company Thames Water to cope with the fluid demands of 21st-century London. Basically it's a giant tunnel, 25 kms long and up to 7.2 metres in diameter, that will largely follow the course of the Thames at a depth of between 35 and 66 metres.

It will run from Acton in the west to Abbey Mills Pumping Station and Beckton Sewage Treatment Works in the east. The scheme includes two connecting tunnels (at Wandsworth and Greenwich/Lewisham) and upgrading London's five major sewage treatment works.

Taking nearly seven years to build, it is scheduled for completion in 2023 and is designed to meet the capital's demands for at least the next hundred years. When finished, the tunnel will have the capacity to hold 1.6 million tons of sewage, meaning that polluting overflows into the river after heavy rainfall will be increasingly unlikely.

The cost of £4.2 billion will be largely borne by Thames Water customers; it is estimated to add around £25 per year to consumer bills by the mid-2020s.

Public Relations Exercise

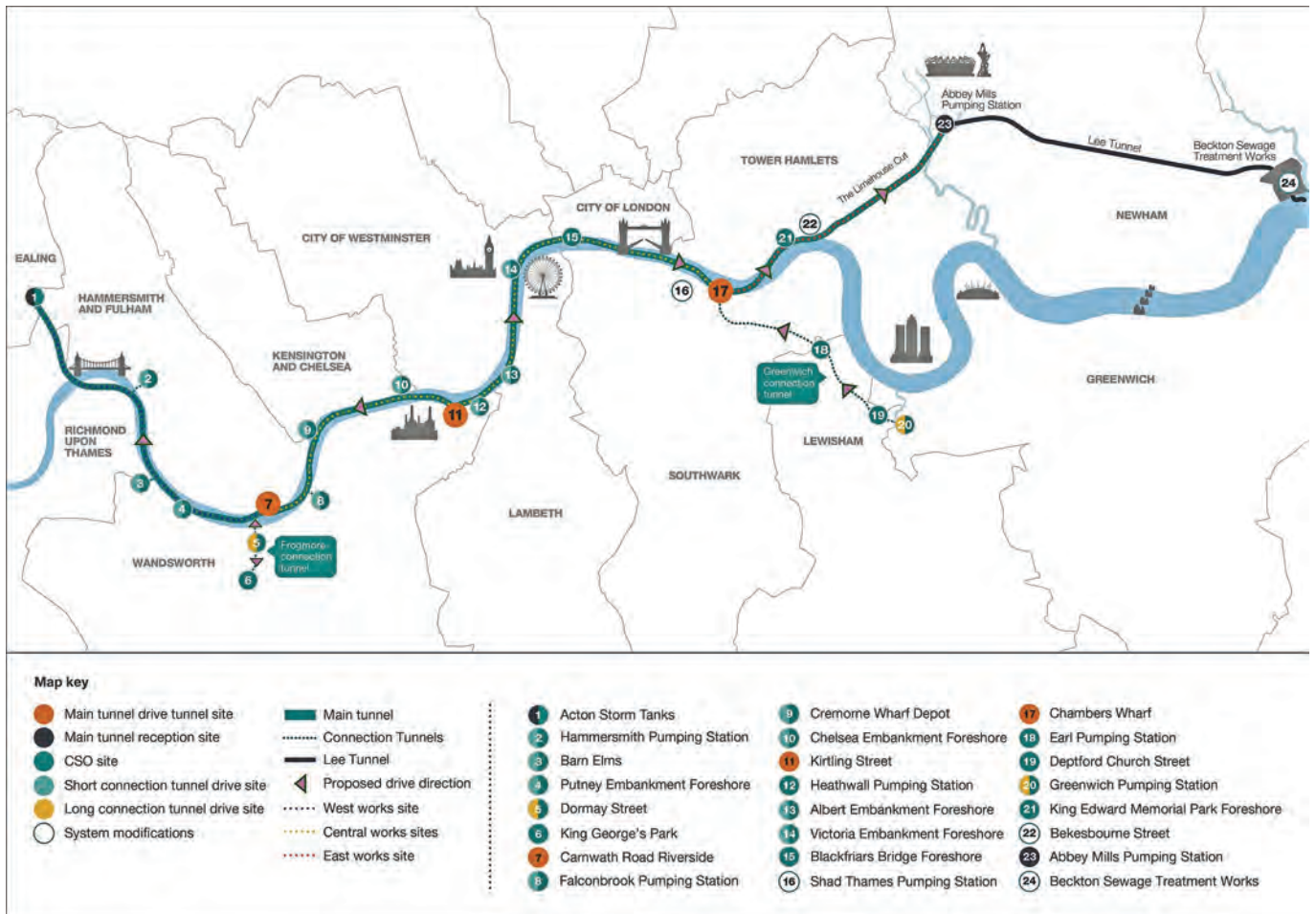
In August last year I was fortunate to be invited to join a cruise on the river sponsored by Thames Water for the benefit of the River Thames Society and GLIAS (Greater London Industrial Archaeology Society). The purpose was to show members of these organisations what a good job the company was doing in cleaning up London's river, where and how the necessary tunnel access shafts were being built, and why it was all so vital for the city's future.

Thames Water's Communications Manager Mike Appleton took the microphone during the two-hour cruise, pointing out the sites where building works were likely to disturb local residents and what the company was doing to minimise disturbance and inconvenience. Facts, figures and tunnel statistics enlivened the commentary.

Afterwards I spoke with the Dixons and suggested that a similar cruise would be a great attraction to Sub Brit, whose members are, of course, enthusiastic about anything underground and tunnels in particular.

Linda followed this up by making contact with Sarah Linney at the Tideway Project and thus it came to pass that earlier this year a Thames Tideway cruise was





arranged for Sub Brit members on Friday 13 April, the day preceding our AGM and Spring Meeting. Up to 150 places would be available on the boat and we would be the guests of the Thames Tideway Project.

had done the organising with Linda) and John Sage, manager of Bazalgette Tunnel Limited aka Tideway, the licensed consortium of companies set up to finance, build, maintain and operate the Tideway Tunnel.



Boarding at London Bridge City Pier

On a sunny afternoon over one hundred members turned up to benefit from a most enjoyable and instructive afternoon on the river, learning more about what is currently Europe's largest civil engineering project.

Victorian genius

Boarding our spacious Thames Clipper boat at London City pier, a short distance from London Bridge, we first headed downstream past Chambers Wharf to King Edward Memorial Park, Wapping, a major CSO (combined sewer overflow) site. Our guides, who took turns with the microphone, were Sarah Linney (who



Linda confirms to Sarah we're all present and correct

Sarah began by explaining why this colossal project was necessary, paying tribute to Sir Joseph Bazalgette (1819–91) whose original London sewerage system, built between 1859 and 1865, was designed to capture both rainwater run-off and the sewage produced by four million people. Now, of course, London's population is twice that, and the Victorian infrastructure, despite being massively over-engineered, struggles to cope. Bazalgette had been appointed after 'The Great Stink' in the hot summer of 1858, during which the stench of sewage from the river had become so bad that Parliament

was on the point of quitting the capital for the country air of Oxford or St Albans.

Bazalgette designed and built an interlinking system of large brick underground sewers running from west to east to take effluent and rainwater to pumping stations at Abbey Mills and Crossness. Much of London's Embankment was built at the same time.



Spoil removal barge at King Edward Memorial Park Foreshore

After viewing the works on the north bank at Wapping, we headed back upstream, with great views of the City skyscrapers, Tower Bridge and HMS *Belfast* along the way. At the Victoria Embankment Foreshore site, opposite the London Eye, we could see the large coffer dam under construction. One unexpected find here was an unexploded WWII German bomb which had to be defused and removed.



Coffer dam at Blackfriars Bridge Foreshore

Over twenty riverside construction sites

John explained some of the logistics needed for such a vast project, involving three huge shafts up to 53 metres deep to provide access for six tunnel boring machines (TBMs); twenty other construction sites, some involving coffer dams; and the erection of “acoustic sheds” to eliminate as much as possible surface noise and vibration. All the spoil removed by the TBMs – gravel, clay and chalk – is being put to good use, carried downstream by barges to the Essex and Kent marshes and recycled as landfill, embankments and wildlife reserves.

Sarah's commentary offered information of a more general nature as we passed under the river's famous central London bridges and briefly glimpsed the outfall points – often just large pipes – of some of London's vanished rivers like Walbrook, the Fleet, the Effra, the Westbourne and the Wandle.



Main tunnel drive site at Kirtling Street, Battersea

At the vast Kirtling Street site in Battersea, in the shadow of the former power station, we could see temporary office buildings, a small forest of cranes and the large acoustic shed, a huge metal construction built over one of the three major tunnel drive shafts, partly to keep out the weather, but mainly to contain noise and dust that might otherwise annoy the neighbours.

The French Connection

The huge shaft here is 32 metres wide and 53 metres deep, and will be used at the end of May to lower the two tunnel boring machines that will begin the slow journey east and west to dig the main tunnel. We could see the two TBM front ends, each weighing 700 tons, on their metal platforms waiting to disappear underground and chew their way to the next drive site, west to Wandsworth (Carnwath Road), and east to the Chambers Wharf, Bermondsey site that we had seen earlier.

The giant machines, not yet connected to all the life support and spoil removal equipment that will make them over 140 metres long and weighing over 1,300 tons, are traditionally given female names. The two here are Millicent and Ursula, named after suffragist Dame Millicent Fawcett and cryobiologist Audrey Ursula Smith respectively.

Each of the project's six TBMs has come from France, shipped by barge in seven or eight pieces and assembled by Tideway engineers on site. After the machines have done their job, it is intended that they will be recycled for use elsewhere.

Westward Ho!

We continued west as far as Wandsworth, passing the old Lots Road power station which is being converted into apartments. At the Carnwath Road site, a smaller sewer spur known as the Frogmore connection tunnel has been dug to the south by TBM Charlotte, while



Tunnel boring machine assembly, Kirtling Street

Rachel in the meantime grinds her way northwest all the way to Acton. (Frogmore is a road off Armoury Way in Wandsworth.)

Over its 25km length, the main sewer tunnel will get one metre deeper for every 790 metres of length. This rate has been shown to be sufficient to keep the contents moving along under gravity. After the tunnel has been fitted with its precast ring segments by the TBM, it is lined with a special concrete finish to ensure it is absolutely watertight and leakproof.

Approaching Putney Bridge our boat did a wide U-turn and we headed back to central London. We enjoyed more views of the river's ever-changing landscape as more and more new office buildings and apartment blocks spring up. As we returned past the Kirtling Street site, the US



Albert Embankment Foreshore, Vauxhall

Embassy's new cube-like structure came into view on the south bank.

Passing under Waterloo Bridge, I was surprised to learn that the Royal National Lifeboat Institution (RNLI) station located here is the busiest in the country.

Environmentally friendly

Continuing her commentary, Sarah emphasised how the Tideway Project is determined to leave a worthwhile legacy for the capital. Not only will the river be almost pollution-free by 2024, but many new jobs and engineering



Back on dry land, members wonder where next?

apprenticeships will go to Londoners, new riverside public parks and spaces will be created and trees planted, and many local communities will benefit from financial support.

Our thanks and appreciation go to Thames Tideway for providing an enjoyable and informative afternoon on the river, Sarah and John for their excellent commentary and Linda Dixon for organising the trip for Sub Brit.

Further information

www.tideway.london

https://en.wikipedia.org/wiki/Thames_Tideway_Scheme

All photos by Clive Penfold



WWI One Hundred Years Ago

Recognising that it is 100 years since World War I, the *Daily Telegraph* has been reprinting articles from the same date last century to give a flavour of how the conflict was reported at the time. In March, they included an article describing part of the vast underground network, used both defensively and offensively, that undermined the Western Front. The complex in question had been excavated by the Australian Tunnelling Company, probably placing it in the Ypres Salient. The article is reproduced here with permission of the *Daily Telegraph*.

FIRST WORLD WAR

The Daily Telegraph

LONDON, TUESDAY MARCH 5, 1918

UNDERGROUND WAR

LIFE BELOW NO MAN'S LAND

FROM PHILIP GIBBS. WAR CORRESPONDENTS' HEADQUARTERS, FRANCE, SUNDAY

I went into a world the other day where no shells, bursting high or bursting low, can have any effect upon our men who live there. No German barrage can "put the wind up," because in this world there is no wind. Visibility may be good or bad, but the enemy has no observation here, though he is on top all the time. I went out into No Man's Land beyond our lines, and was as safe as in the Strand at home, though only a few yards away from the enemy's outposts. For this world was deep underground. It is a place of long galleries, 60ft below the outside earth, in which one may walk for hours and hours and not come to the end of them. I walked for hours and my guide pointed to the entrance of another gallery and said: "That would take another day to explore."

My guide was one of the officers of the Australian Tunnelling Company, which during the past two years has done a great part of the work in boring this subterranean system below some section of our battle line. They are mostly miners from the gold fields of Western Australia - hard, tough fellows with a special code of their own as regards their ways of discipline and work, but experts at their job, and with all their pride in it, and a courage which would frighten the devils of hell if they happened to meet in the dark. When they first came over the Germans were mining actively under our lines and blowing up our infantry in the trenches. It was the worst terror of war before poison gas came.

ENEMY MINERS BEATEN

It is many months now since the enemy's mining activities were reported in our communiqués. They were beaten out of the field by British, Australian, Canadian, and New Zealand miners, who fought the Germans from gallery to gallery, blowing them up again and again whenever they drew near. The Australian tunnellers drove in at three times their enemy's speed, blew in the ends of one of his galleries and then broke through his timber into the tunnel. The dash through of the Australian tunnellers with rifles and revolvers was an exciting adventure. The enemy had escaped, but their system was destroyed before they could touch off their mines. The Germans know now that they are beaten underground, and not a single infantry soldier of ours has lost his life by hostile mining since the Australians challenged the enemy and beat him in this part of the battle front.

It is an uncanny thing to walk through this subterranean world. It was dark in the beginning of the tunnels. Men pressed against the

chalk walls to let us pass, and I heard their breath, and sometimes there was the clank of steel hat against steel hat. Here and there for 500 yards or so the tunnel roof was so low that one had to walk half-doubled. A candle held by the man in front was the only light in the blackness. But presently a tall man could walk upright, and long galleries were lit by bulbs of electric light.

SUBTERRANEAN DWELLINGS

On each side of the galleries were rooms carved out of the chalk. They were furnished with wooden tables and benches, and the miners were playing cards there. Through holes in the chalk walls I looked into caverns where men lay asleep in bunks. Not far away was a room from which a fierce heat came and a smell of good food cooking. It was the kitchen, with big stoves and ovens, where meals were being cooked by sweltering men, within a few yards of the front-line trenches.

In other rooms were field dressing stations, and we came to a subway with trolley lines, down which the wounded are brought from the battlefield up above.

LISTENING TO THE GERMANS

We went deeper down and further forward. In one room men were listening like telephone operators to the sounds of German life in other tunnels like these, the sounds of men walking and talking and filling sandbags and moving timber. The listeners are so expert that they can tell by the nature of the sounds exactly what the enemy is doing through a chalk wall 70ft thick.

Presently we went into one of the fighting points beyond the lateral galleries. My guide said: "We are now out in No Man's Land." It was a safe and pleasant way of wandering into No Man's Land. The war seemed a world away. It was only some hours later, when we came up to the surface of the earth and saw the sky again and the dreary waste of the battlefield, and heard the cry and crash of scattered shells, that we remembered our whereabouts and this business above ground. It is a strange life below the fields of death, and there is a sinister purpose at the end of the tunnels, but these men, by their toil and courage, have saved the lives of many hundreds of British soldiers, and long after the war is finished this underground world of theirs will remain as a memorial of their splendid labour.



Broadway Royal Observer Corps Post, Worcestershire

Linda Dixon

During the late May Bank Holiday weekend we found ourselves in the Cotswolds with some friends, so what better on a lovely sunny Sunday than to visit Broadway Tower – and sneak a peek at the underground ROC Post located nearby (both open to the public for tours).

First we visited the tower, with three floors of exhibitions – including one floor dedicated to information about the ROC – and then took in the views from the roof which were amazing; it is claimed that you can see sixteen UK counties from here!



Martin Dixon with guide David Walton

We then bought our tickets for the ROC bunker from James Crofts, the Curator (and SB member), and enjoyed a tour conducted, very knowledgeably, by David Walton. We spent nearly an hour, both on the surface hearing about the history and then descending into the bunker for a good look around. David managed to strike an excellent balance that was informative to both experts and lay visitors.

Cold War history

The bunker was one of over 1,500 posts built in the 1960s to monitor and report the effects of possible nuclear explosions and the resulting radioactive fallout during



the Cold War. It was closed in 1991 when the Royal Observer Corps was stood down but has now been fully restored to how it would have been in the 1980s at the height of the Cold War.

The bunker has been kitted out with a wide range of contemporary equipment and gives a very good idea of how chilling it must have been at the time to face the threat of nuclear war. Surface remains include an intact 'Orlit A' (a later observation post).

I thoroughly recommend a visit – the bunker is open at weekends and Bank Holiday Mondays during the summer. Pre-booked parties can also visit during the week, if any Sub Brit member fancies arranging a trip!

The Tower and Post are located near the lovely village of Broadway, not far from Evesham, postcode WR12 7LB. See www.broadwaytower.co.uk for details on visiting hours and ticket prices.

The site is one of almost three hundred publicly accessible sites listed in the Sub Brit Site Directory, available to buy online via our website for £5 plus postage.

Internal photos Linda Dixon



Rapid active pseudokarst near Redhill in East Surrey

Paul Sowan



The inner end of the largest cave is still within reach of daylight. The cave is eroded, extended and enlarged by the running water which washes out the sand. Unlike most British caves, the rock is not removed by solution.



First published in the Croydon Natural History and Scientific Society Bulletin 1989, No 2

During August 1989 a small group of members of Croydon Natural History & Scientific Society and Unit 2 Cave Research and Exploration (now Wealden Cave & Mine Society) examined and recorded some rapidly evolving 'pseudokarst' caves eroded mechanically (rather than chemically) by water flow through an artificially-created Folkestone Sand cliff overlooking deep opencast workings for Fullers Earth within 1 km to the NE of Redhill [approx. TQ2951].

Impermanent cave at the west end of the pit. Folkestone Sand is classified by engineers as on the borderline between an 'engineering soil' relatively easily dug out as friable lumps, and an 'engineering rock' which can with care be cut out as coherent rigid blocks. It contains minimal or no mineral cement holding the sand grains together and is, technically, a 'locked sand'. Photo Peter Burgess



The Folkestone Sand was being removed, as overburden, preparatory to opencasting for the underlying Fullers Earth in the Sandgate Beds. Three caves of sufficient size for exploration were observed, as well as a number of smaller water-eroded tunnel remnants associated with them. It appeared that the artificial cliff produced by the opencast working had, in being taken northwards and westwards, cut into the cave systems.

The largest and most impressive cave had an entrance arch of about 12 metres span, and a maximum ceiling height of 3-4 metres. The cross-sectional area diminished inside, but remained at least at comfortable walking height for some 30 metres underground. The cave was evidently being eroded by an active stream which emerged, at the innermost recess, from a tunnel too small to explore.

As this cave was relatively large and straight, there was daylight penetration almost throughout. Caving lamps were helpful only in the innermost recess. Considerable quantities of sand freshly fallen from the ceiling indicated the cave to be in a very active phase of its evolution.

A simple survey was made, and the surveying team returned to the surface at the earliest possible moment, having received the information from persons still outside in the open sandpit that a second such cave had just quite spectacularly collapsed!



Cave in the northern working face of the sand pit. The quartz sand of the Folkestone Beds (Lower Greensand) is here slightly stained orange by an iron oxide mineral. Thin veins of iron-oxide-cemented sand known as car-stone can be seen in the rock face above the cave. The very hard car-stone has been used locally in very small pieces for hard-wearing surfaces for paths and steps. The stones in the stream bed are pieces of this material. Note the three human figures to appreciate the size of the cave

In front of this first cave the stream ran through a deep, wide gully before plunging over a small cliff formed by the top of the Sandgate Beds. The gully walls contained several small abandoned water-eroded tunnels, presumably precursors of the cave as inspected. It seemed more than likely that the development of the cave had

been accelerated, if not initiated, by the steepening of the local hydrological gradient caused by the excavation of the deep pit for Fullers Earth.



Looking into the largest cave from the entrance. The scale stick is 2 feet.

The second cave having collapsed, and being no longer available for examination, the surveying party turned its attention to the third and last structure. This appeared to be in a more stable condition than the other two. There was no active stream flowing from it, as its mouth was partially blocked by a steep bank of freshly fallen sand. Exploration revealed what at first appeared to be still water underground, and a way on the left that was not lit by daylight penetration.

By crawling through a roof-fall area of some 20 metres it was possible to examine the entire accessible extent of the cave. As the surveying team were about to leave, it was noticed that the hitherto completely still water in the 'underground lake' was starting to well up in the innermost recess. Clearly this, too, was an exceptionally active cave despite earlier appearances. The party left without further delay.



Here ground-water within the Folkestone Sand, held up by a seam of car-stone, is seen surfacing, eroding a small canyon



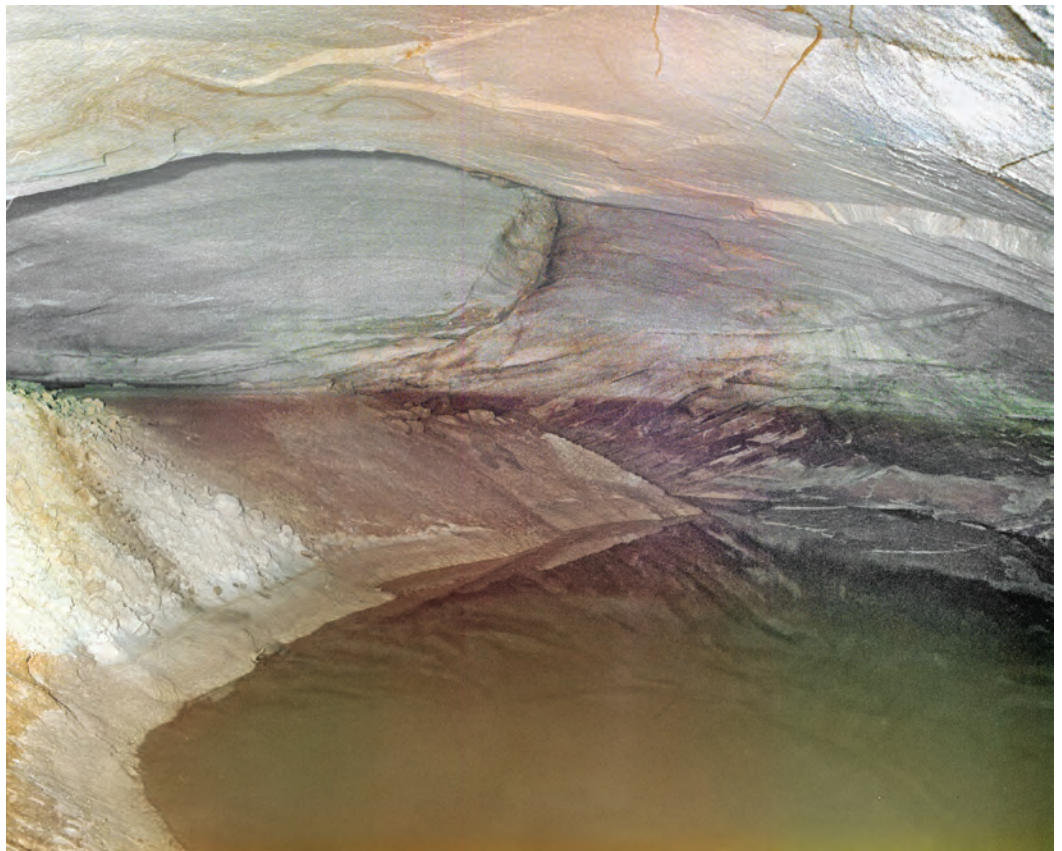
As to the safety aspect, although any prolonged visit to any similar cave cannot be recommended, the few minutes spent underground surveying these extraordinarily interesting features probably exposed the surveyors to no more danger than crossing a number of main roads shortly after pub closing time!

Photos by Nick Catford unless stated.

*The third cave is not lit by daylight penetration.
The author is seen crawling over a roof fall to reach the underground lake*

Despite what, on reflection, might be seen as unacceptably high risks of burial alive, the two caves examined were of very considerable interest. Their development on a scale sufficient for human exploration, and their rapid evolution, was remarkable, and almost certainly precipitated by the active opencasting causing the groundwater in the Folkestone Beds to drain more rapidly than normal towards the large open pit.

I am not aware of any really comparable caves elsewhere, although as such features are essentially transient (the two caves surveyed have since completely fallen in), it is entirely possible that others have formed and vanished without ever being noticed.



The underground lake in the third cave. Shortly after entering the chamber the still water seen here began to well up and it was time to get out quickly

RAF Lakenheath - the Liberty Wing

Keith Ward



Aerial shot of RAF Lakenheath. The domestic site is to the left, the operational runway runs left to right. Beneath this are the three squadron areas with their Hardened Aircraft Shelters and the technical area (centre)

On 8 June Tony Radstone and Martin Dixon arranged a Sub Brit visit to RAF Lakenheath - now the home of the US Air Force in Europe 48th Fighter Wing. It is the only Wing in the USAF to have both a name and a number, being also known as the (Statue of) Liberty Wing. Although nominally still an RAF station, the US element comes under the command of the 3rd Air Force at Ramstein in Germany. The Wing has been present on site since 1960 when it moved from Chaumont air base in 1960 after General de Gaulle ordered all nuclear-capable US forces out of France.

A Brief History

The origins of the base began in World War I as a Royal Flying Corps training and bombing range. It also started World War II with the intent of attracting bombs as it became a decoy airfield for nearby Mildenhall; false runways and lights were installed in 1940. By 1941 however it became an operational bomber base as a satellite of Mildenhall and RAF 149 Squadron moved in using Stirling bombers. In 1943 199 Squadron also moved in until May 1944 when they both moved to Methwold.

This made way for the United States Army Air Force to move in with extensive reconstruction as a base for the B29 Superfortress bombers. However the war was over before construction finished, although runways were extended and extra hardstandings put in.



RAF Lakenheath Station crest.

The Latin motto translates as 'That Eagles may Fly'

With increasing tensions with the USSR, RAF Bomber Command rehabilitated the airfield in 1948 with a temporary deployment of strategic air command USAF B29s. In November of that year control passed to the 3rd Air Force based at Ruislip under USAFE (United States Air Force Europe) and by 1949 was one of three SAC (Strategic Air Command) bases in UK, the others being Marham and Sculthorpe.



Over the next few years 33 squadrons passed through on rotation with upgrades to B50 Superfortress and the B47 Jet bomber from 1954, and in 1956 there was a short term deployment of CIA detachment A with the revolutionary new U2 Spy plane; however this paled into insignificance that year when a B47 bomber crashed into the igloo nuclear bomb stores carrying three mk6 nuclear bombs. Luckily the fissile cores were not installed but 8,000 pounds of explosives for the trigger mechanism was; there was a massive evacuation of the base with eyewitnesses seeing convoys of cars leaving in a hurry in what was the only major nuclear-related accident at a UK base.

Fighters Arrive

In 1960 the base's days as a bomber station ended when it became a fighter base, with the 48th Fighter Wing moving in from Chaumont in France under Project "Red Richard" (after de Gaulle's anti-nuclear weapon stance). The wing was initially equipped with the classic F100 Sabre jet with three tactical fighter squadrons (492/493/494). Bomber bases moved further west with fighters deployed to the east of NATO territory.

Gradually aircraft were upgraded with (in turn) Douglas Phantoms (F-4), General Dynamics Aardvaarks (F111) and from 1992 the current McDonnell Douglas Eagles (F15E). 493 squadron inactivated in 1992, however it was reformed in 1994 when forces moved with the closure of Bitburg air base in Germany as part of the post Cold War rundown of German bases.

To summarise, the current situation is:

48th Fighter Wing (Liberty Wing)

with the following squadrons,

492th and 494th with F15E (two-seat strike fighters)

493th with F15 C/D (tactical fighters, mainly single seat)

It is not USAF policy to disclose actual resource levels but the three squadrons total around 75 aeroplanes.

Nearby Bases

Nearby RAF Feltwell is a satellite base and is a major communications centre and personnel housing area. Feltwell is perhaps better known for the period in the early 1960s when this former WWII bomber base became a Thor intercontinental ballistic missile site for just a few years (all Thor sites were disbanded by 1963). Since then Feltwell was developed as a major communications site involved in early warning, the radomes being clearly visible from Lakenheath.

The nearby World War II bomber base at Mildenhall was developed postwar as a major USAF transport base and was not part of the 1970s/80s hardening programme.



*F100 Sabre as the RAF Lakenheath Gate Guardian.
The F100 served at Lakenheath between 1960 and 1972.
Photo Keith Ward*

As part of future planning the transport base at Mildenhall has a phased closure with extensive development of Lakenheath and a lot of new housing being built on base and at Feltwell. The latter will replace the comms base at Molesworth and support base at Alconbury which is closing shortly.

Arrival and Welcome

So on 8 June a group of 39 keen Sub Britters gathered at Mildenhall bus station in brilliant weather in anticipation of an exciting day. Everyone arrived well before time but nearby shops allowed sandwiches to be bought and the excellent adjacent tourist office provided local information.

We had been instructed to arrive in a single vehicle for security reasons and we boarded the impressive coach of Neals – a local coach company that does extensive work for USAF – and their security-cleared driver Graham. Martin gave a potted history of the site en route and Graham gave us details of the domestic site as we approached the base. As so many Sub Brit visits



The Sub Brit group pause for a photocall in front of one of the Oshkosh Airfield Fire Appliances. Photo Gerald Tompsett



are to derelict and abandoned sites, it felt quite odd to be approaching a location that was 100 percent active and protected accordingly.

We entered the base at the HGV entrance (Gate 8) and were met by our hosts for the day from the Public Affairs Team. Leading these was Master Sergeant Burks with three of his colleagues. We had all submitted photo ID information, dates of birth and even next of kin details in advance and these were checked by the security detail (a mixture of USAF and MoD staff).

The coach then entered a screening / scanning building where we all disembarked and every locker on the coach was searched. We felt well-protected as a soldier patrolled with machine gun on the gantry above! After reboarding the coach we passed the huge fuel storage area (and a golf course!) and proceeded to the main control tower area. Here we were introduced to our guides and were split into three groups.

The Visits begin

When requesting a visit, for which there is a high demand, you are able to request categories to visit from a list of options. Regrettably an F15 flightline visit was not granted (as it rarely is). However we had been granted access to the Control Tower, Radar Approach Control (RAPCON), Weather Office, Explosive Ordnance Disposal (EOD), and the Fire Department, so we had a very interesting selection to look forward to.



*Part of one of the F15 Squadrons on the apron and ready for their next flight.
Photo Gerald Tompsett*

Each group visited the first three sites in a different order to ensure that the sites weren't too crowded, so I'll describe them in the order I visited. Our first visit was to the 48th Operations Support Squadron (Eagles Rock), specifically the Radar Approach Control room which is in a building adjoining the Control Tower. We entered a large darkened room filled on the perimeter with glowing radar screens and operators. Cameras and mobile phones were left at the entrance to prevent any distraction or interference to the operation.

The radar covers a 45 mile radius and in the north we could see RAF Marham (where RAF F35 B Lightning stealth fighters had arrived earlier the same week). To the south lay Stansted airport into which a steady stream of Ryanair jets could be seen on their approach. Lakenheath itself was included in a combined MATZ (Military Air Traffic Zone) with nearby Mildenhall.

Danger Area

Close in to the airfield was the clearly marked Delta (Danger area) 208 Thetford Forest / Stanford battle training area. Here there is approval for live firing and for



A F15 Eagle makes a stunning picture during a run-in and break to land. Photo Nigel Ostler-Harris

troop insertion by helicopter so off-limits for overflying unless involved in a specific exercise. We could also track a pair of F 15s from Lakenheath which were inbound to land. Both the radar tracks and the roar of engines showed they had performed a 'run-in and break' rather than a direct approach to land. One of the other groups had the good luck to be up the tower to witness the approach and eventual landing.

As at all sites, the friendly operators answered our questions and we were still asking questions when moved on to our second site of the day. This was up to the top of the control tower; those who walked up were treated to some interesting wall art

on the stairway. From the top we had a panoramic view of all parts of the base. Sadly there was no flying during our own visit but it did free the controllers up to talk about their role. The tower covers the immediate area of the airfield (around a two-mile radius) working in tandem with approach control below. As well as all the high tech equipment, an old fashioned light gun allows coloured signals to be given to aircraft with radio failure.



*The modern RAF Lakenheath control tower, the adjacent building houses the Radar Approach Control.
Photo Keith Ward*

We were allowed onto the outside balcony where photography was permitted. From here we could see one of the squadrons parked and ready for action. Across the live runway we could see ammunition bunkers and the area recently vacated by the 56th Rescue Squadron of HH-60G Pave Hawk helicopters. And in the distance we could just see the corresponding control tower at RAF Mildenhall around five miles or so to the southwest.



The view from the control tower with HASs (Hardened Aircraft Shelters) in the distance. Photo Gerald Tompsett

Well Met

The third site we visited in small groups was the Weather Squadron which provides both general and bespoke forecasting for the flight squadrons. They have access to lots of live satellite images and work closely with the pilots. Sometimes this can include advising on the best areas for specific training details and of course likely weather en route and at destination for live missions. As a necessity much of the current forecasting covers the Middle East.

In some cases the weather experts deploy to a specific area and a wall map showed the many countries of the

world where temporary deployments had been made. One vital aspect of their analysis is the expected sea temperatures en route which strongly influences the need to wear bulky and uncomfortable immersion suits for an exercise or mission.

All three groups then reboarded the coach and we headed off to the next site. On the way we could see that the USAF uses standard pattern buildings at all its sites after the late 70s hardening plan. We have been able to visit equivalent disused buildings over the years at closed bases like Bentwaters and Upper Heyford.

Base Buildings



*The telecommunications transmit and receive building.
Photo Keith Ward*

The main command bunker adjoining base HQ and the nearby protected telephone exchange mirrored Upper Heyford. Each Squadron area has a main Squadron HQ with briefing and training rooms and a hardened operations room. These and the Squadron HASs (Hardened Aircraft Shelters) were also familiar to those who had visited Upper Heyford.

There would be a standby to the main HQ bunker but this was not apparent. The transmitter / receiver site with its aerials was housed in a hutted block possibly dating from WWII. It is worth noting that in the period up to 1967 when USAF SAC

(Strategic Air Command) operated from UK as main nuclear deterrent there were no hardened buildings on site; each base having an off-site war HQ – in the case of Lakenheath it was RAF Feltwell. It was only in 1978-81 that a programme developed to build hardened operations rooms and HAS.

The last building of interest seen from the coach was the photo interpretation building, a hardened structure where the photographic section downloaded aerial reconnaissance films. It looked identical to the one at Upper Heyford but not as impressive as the listed ‘magic mountain’ one at Alconbury. Like Upper Heyford it is

close to the perimeter fence near to public road and dates to 1988-90.

Bomb Disposal

Our next port of call was the EOD (Explosive Ordnance Department) area, what most people would know as bomb disposal. We passed an impressive line-up of specialist vehicles including Hummers lined up outside, ready for deployment for incidents on or close to base. As well as munitions, the experts also have to consider fuel and ejector seats in making areas safe.



Vehicles outside the Explosives Ordnance Disposal unit, including High Mobility Multipurpose Wheeled Vehicle (HMMWV or Humvees). Photo Keith Ward

Our very friendly and interesting guide showed us a selection of robot devices and equipment used to defuse explosives, jokingly saying he loved to play around with explosives! It's the sort of job where you need a sense of humour, and it was a privilege to hear from someone who had served in theatre and whose description of his role was 100 percent from personal experience.



Our host at the IOD unit surrounded by some of his tools of the trade. He is holding his personal Kevlar vest. Photo Gerald Tompsett

Again lots of questions were answered – except understandably a few relating to the specific explosive cocktails currently being encountered in the field.



Lightweight robot used for assessing IEDs (Improvised Explosive Devices) in the field. Photo Gerald Tompsett

Let us Spray

Our final stop of the day was the Fire Department, whose impressive station would suffice for a sizeable town. The station is manned by the 48th Civil Engineer Squadron Liberty Wing Fire Dept, a joint civilian and military force. The civilians provide vital continuity and local knowledge of the geography of the base.

The lead civilian had 25 years with Essex fire service and another is a retained fire fighter locally. In terms of vehicles, the equipment was impressive – three massive Oshkosh airfield fire pumps and three 'Emergency One' appliances, mainly for 'domestic' rather than aviation related incidents.



Two of the 'domestic' fire appliances at the RAF Lakenheath Fire Station. Photo Keith Ward

We went onto the area outside the station and were given a brilliant demonstration of the Oshkosh's foam and water spraying ability. The main turret (jet) is mounted on hydraulic arms that allow it to rise to an immense height. It also features a pointed lance so that aircraft structures can be penetrated for internal fires. The engines also have a front fender (bumper) mounted spray to provide some heat protection to the operators within the cab.

All of this was demonstrated for us and due to the prevailing wind we also experienced some of the cooling





Oshkosh airfield fire appliance in action. The elevating turret with lance attachment can be seen and the front fender spray is being deployed.

Photo Keith Ward

spray for ourselves. Within the station was an actual F-15 cockpit used for training. The fire department's main focus is on-base incidents but they also attend to any off-base plane crashes nearby; fortunately the last major one was about 18 years ago. They do not assist local brigades on normal fires.



Your author poses as a Fire Chief

In the distance was the large igloo explosive and former nuclear storage area but cameras were not allowed to be

pointed towards the airfield; this is covered by specialist units for any nuclear incidents.

Departure and Thanks

That ended a superb tour and after saying farewell to our hosts we drove out through the number 1 Gate. We passed quite a few WWII huts still in use contrasting with the 48th Fighter Wing HQ – an impressive new building. We also spied an American police car used on base and the large commissary PX store which offers substantial discounts to serving personnel. Adjacent was a Harley-Davidson shop and driving back to the gate gave every impression of actually being in the USA (except for driving on the left). Fire hydrants above ground, a US style gas station and kids playing baseball on a purpose-built court were also seen.



World War II era huts are still much in evidence around the technical area. Photo Keith Ward

On exiting, we saw the gate guardians of an F-100 Sabre and a replica Spitfire for good measure.

After our hectic schedule, we drove back to Mildenhall bus station for our onward journeys. Mildenhall is quite a vibrant centre for the area and boasts regular National Express coaches to London and Heathrow and plentiful shops (and banks!). It remains to be seen how the closure of Mildenhall Air Base will impact on the local economy but hopefully developments at Lakenheath should mitigate as well as the proposed industrial use for site.

Thanks to Martin and Tony (who sadly couldn't make the visit itself) for organising the trip and to our friendly hosts for showing us a bit of what goes on behind the scenes. Although nothing underground was expected or entered on the visit, the comparison with disused sites and the excitement of seeing a live station made the visit more than worthwhile.



Cambridge Regional Seat of Government: Life in a nuclear bunker: food for thought

Hillary J Shaw



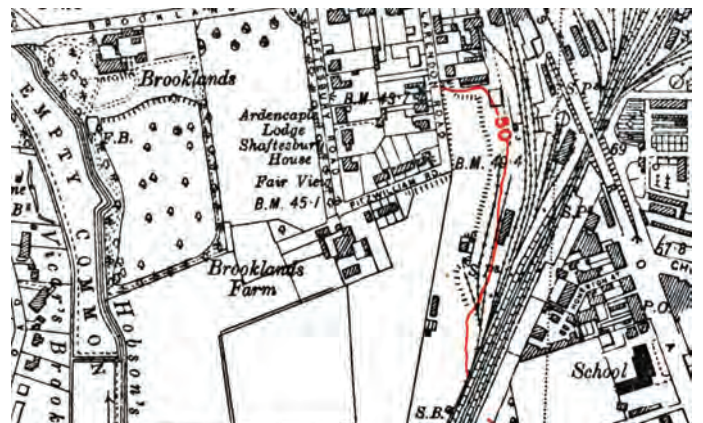
The entrance to the bunker in 2001, before the site was redeveloped. The two-storey extension seen to the rear effectively tripled the size of the bunker; increasing its staff capacity from 50 to over 200. Photo Nick Catford

General history of the Cambridge RSG

Visitors to Cambridge come to enjoy the historic buildings and cafes, but very few will be aware of the relics of a very different history associated with the city. Just 20 minutes' walk south of the centre lies a Regional Seat of Government (RSG). This consists of a large bunker which would have been one of eleven administrative centres across Britain, had nuclear war broken out. The structure was originally built in the early 1950s (at which time it was designated a Regional War Room) and expanded in 1963 to become an RSG.

On Friday 13 April (an auspicious date!) Steve Matthews of the University of Cambridge, the current owners of the RSG bunker, kindly arranged for a visit by Subterranea Britannica. Due to high demand for this visit and limitations on numbers he also generously arranged a second visit a week later.

The government/defence history of the site goes back to World War II, prior to which the site had been part of the large gardens of Brooklands House, Brooklands Avenue, with Hobson's Brook just to the west.



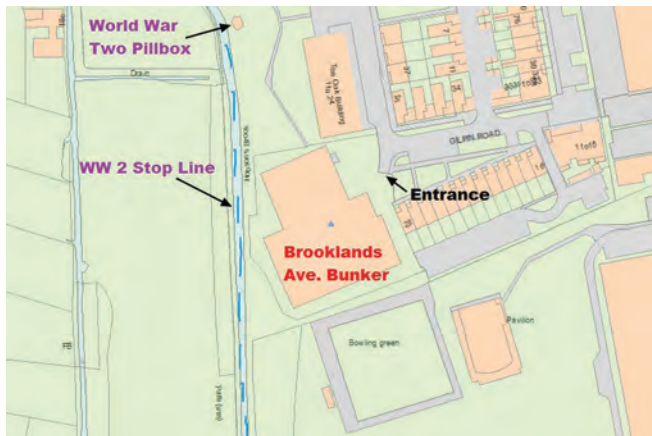
The Cambridge RSG site just after World War II - 1946 OS 6" map



The actual map was published in 1946 but the survey date was pre-war. Brooklands House has not yet had its garden taken over by the military.

This brook was deepened and widened during World War II, partly to alleviate flooding problems (its shallow gradient meant it was prone to silting), but also to form an anti-tank barrier as part of the system of ‘stop lines’. It would scarcely be an obstacle to today’s tanks but these machines were much smaller in the 1940s. There is a relic of this era just north of the RSG bunker where a WWII pillbox (sealed up) still exists, now almost hidden in brambles and trees.

Given the rationing situation that existed in the UK in WWII, with U-Boat raids on food convoys, one has to wonder how long the rest of the UK could have held out if German forces had occupied the fertile farmlands of East Anglia and much of the Fens. The position of the RSG bunker, WWII stop line and pillbox (covered by trees) can be seen in the modern map extract below, and in the aerial photographs.



The Cambridge RSG site today (source, amended from plan by National Map Library of Scotland). Acknowledgements here to James Sansom for information kindly supplied regarding the World War II history of the area



Aerial view of RSG bunker, also showing stop line brook, and pillbox location (under trees, top centre). Aerial photo kindly supplied by Francis Creese

By 1950 the government had built administrative offices over much of Brooklands House gardens, although the

bunker itself does not appear on the 1952 map below. About the only relic of the administrative offices still surviving is a short stretch of disused footpath opposite the WWII pillbox.

There is now a modern residential development (Accordia Living) covering the site of the 1950s offices; fortunately the RSG bunker itself, with its five-foot-thick concrete walls, was simply too hard to demolish; the presence of asbestos is also a deterrent to the bulldozers. The site now has the protection of being a Grade II Listed building since July 2003.

The RSG was acquired by the University of Cambridge in the 1990s, and lay empty after much of the furniture and movable equipment was removed. The only action the RSG ever saw was dummy-run evacuations into the facility from the now-demolished government administration offices next door. The University plans to use the building for secure storage; the massive construction design has ensured the RSG is (almost) waterproof.

On a visit in May 2000 the *Cambridge News* reporter noted the total absence of any life inside: “no spiders, ants or moths”. Visitors will indeed note the almost total absence of any cobwebs, a sign that nothing can live inside due to lack of food and especially water. However in 2018 a few stalactites are starting to form in the ceiling of one room and some water-staining on the floor in places proves that water can finally penetrate even a nuclear-proof building, given enough time.

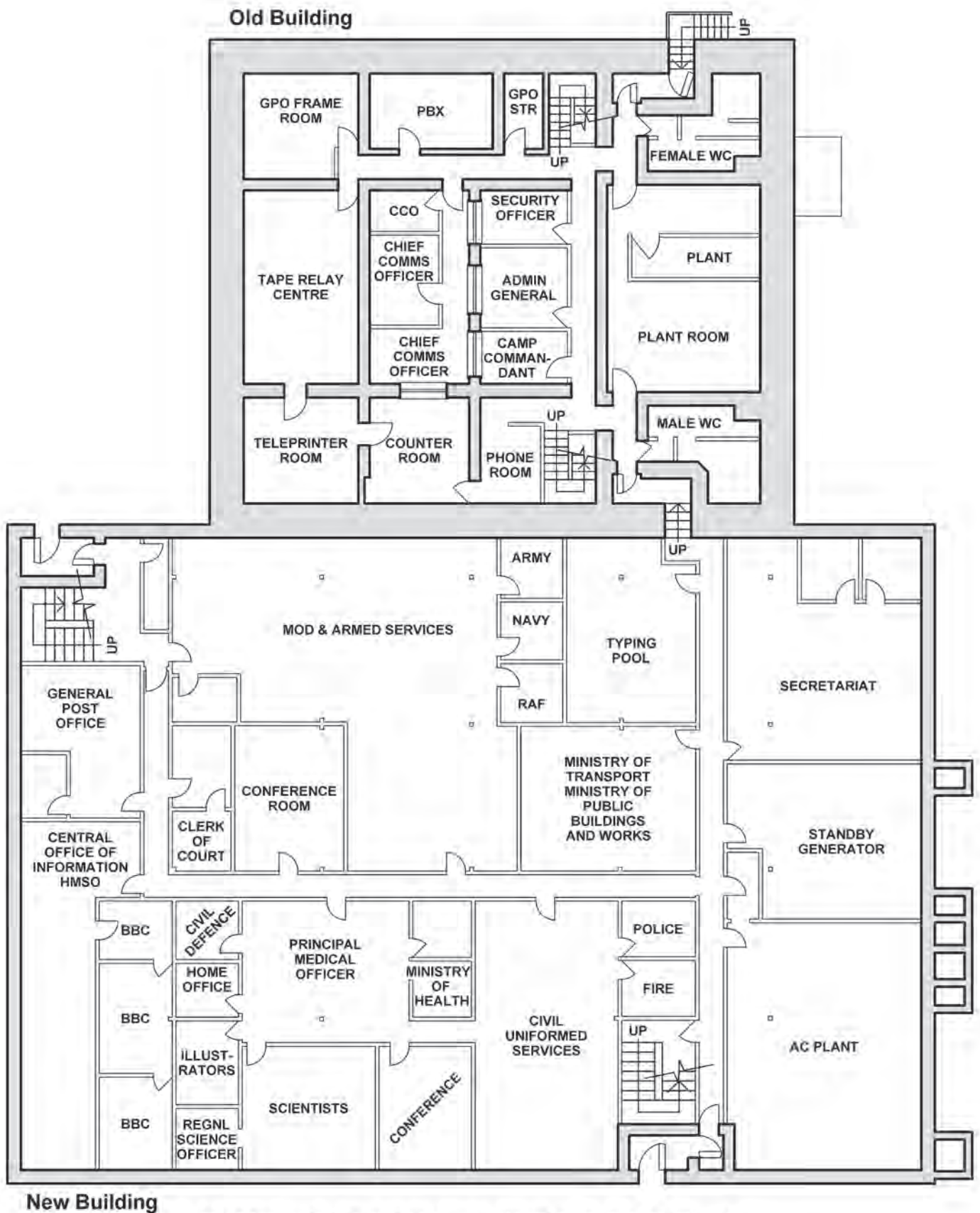
Ivy and trees growing around can also threaten and crack even five-foot concrete, and this greenery is in the process of being removed. Compare the external photo at the start of this article with the aerial photos above.



The Cambridge RSG site in 1952. (OS 6" map)

Construction and usage of the bunker

The Cambridge RSG was constructed in two phases; the first, smaller, northern, construction dates from 1953 and was later tripled in size with a southern addition in 1963. The original building was designated a ‘Regional’ or ‘Civil Defence’ War Room and would have monitored the progress of World War III in the event of a nuclear war with the USSR.



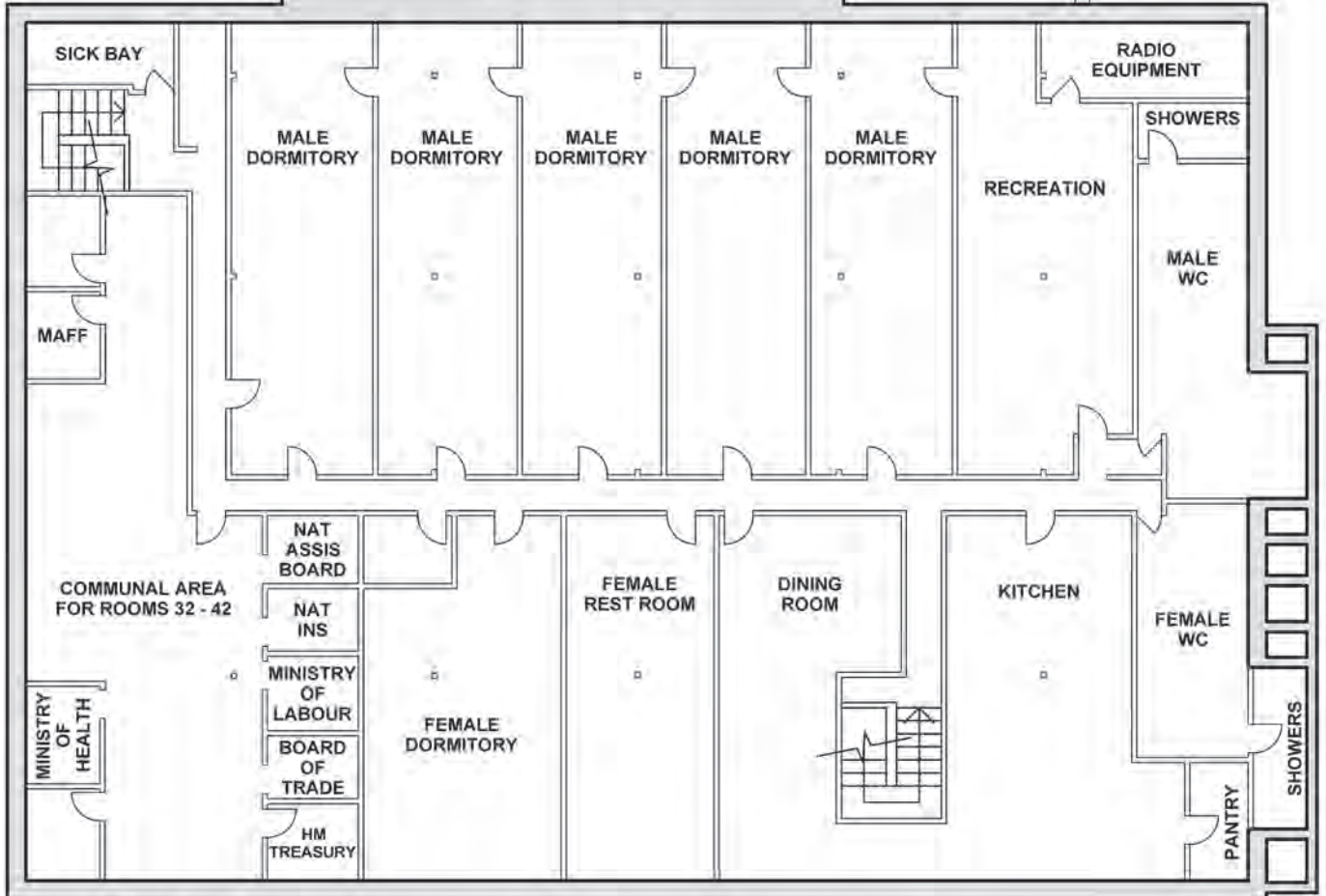
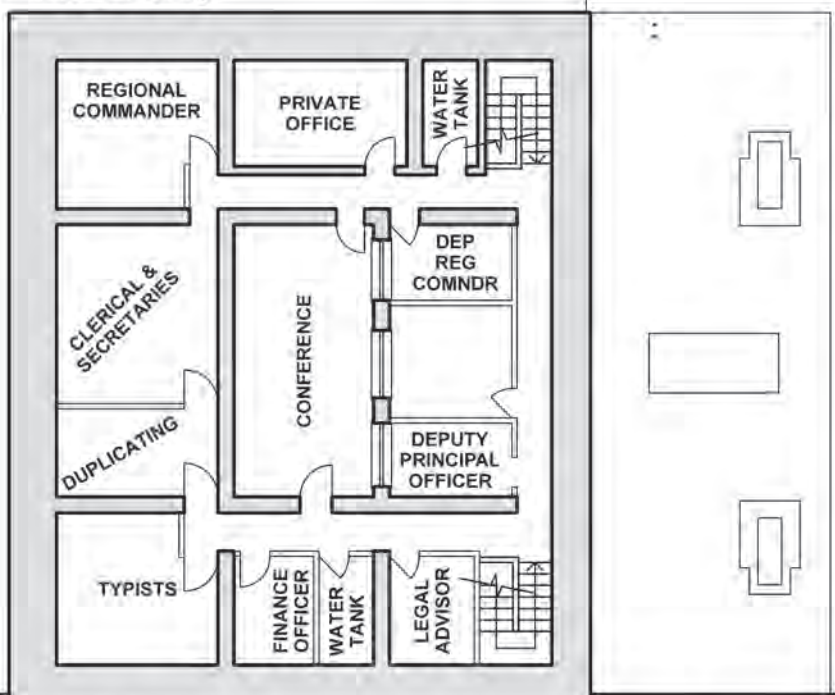
CAMBRIDGE RGHQ - LOWER FLOOR PLAN

Drawn by Tim Robinson

Ground floor of the Cambridge bunker. Only the top entrance, of the smaller older building, remains accessible; the other doors are permanently sealed



Old Building



New Building

CAMBRIDGE RGHQ - UPPER FLOOR PLAN

Drawn by Tim Robinson

First floor of the bunker. There is no link at this level between the old and new buildings. Note the excess of male dormitory space over female, also the government offices, including pensions, sited to the lower left on the new building



In the event of attack, resources would have been mobilised and sent to areas of damage and casualties. A key feature of the 1953 building is the map room, with its curved reinforced Perspex viewing windows. This is the ‘chief communications’ area in the ground floor of the plan.



Ground floor map viewing area, with curved windows. The ceiling above was not originally present, but there was a balcony on the upper floor for further map viewing

Other photos of this room, which used to be two-storey with a viewing balcony area above before an extra floor was inserted, also other photographs of the RSG, are available on the Sub Brit website.

By the 1960s it was clear that nuclear war could be much more devastating than the attacks on Japan in 1945, with the advent of the much larger-yield H-bombs. In October 1961 the USSR detonated the Tsar Bomba (King Bomb) over Novaya Zemlya, which if dropped on London could have destroyed an area from Brighton to Cambridge in one burst. The Tsar Bomba was the largest practical nuclear device possible, since any larger explosion than that would have punched through the Earth’s atmosphere and ‘wasted’ much of the blast effects out into space.

The complete RSG bunker plan is shown on the previous two pages. Note there is also a small basement level not on these plans accessed by the southernmost stairs down to two fuel-storage rooms – which smell of diesel even today. The basement still contains the concrete ridges on which the old fuel tank would have sat.



Basement fuel tank room. There was a further room to the left of this, unlit and inaccessible except for a small ‘window’. Photo Julia Shaw

The RSG was a complete mini-government site, with all the functions of the whole country on a much smaller scale. From within, civil servants could monitor what was going on outside, make broadcasts (for whoever was left to listen to them), organise rations distribution and generally try to maintain some semblance of a normal administration.

The BBC actually has a rather generous allocation of rooms compared to say police or fire service. One of these rooms is shown; in a rare case of ‘helpful’ damage, some of the sound insulation has been pulled off the wall, revealing the method of construction of this insulation here.

There was also a room for an ‘illustrator’; presumably they intended distributing paper-based publicity as well as radio broadcasts. How this would have been done from a sealed bunker in the middle of a nuclear war is unclear.



BBC office with a window into the BBC studio. The studio had sound insulation. The rest of the bunker could have been a noisy place with machinery and (probably frantic) people rushing around keeping track of nuclear bursts and enemy action. Photo Nick Catford

No privacy

The Cambridge RSG was a place with sleeping, eating and washing facilities where several hundred civil administrators and military could exist for some weeks until it was safe to venture outside. One major thing missing in such an environment would be privacy, and sufficient room for private possessions.

Meanwhile, although almost all the furniture had been stripped out, apart from some government-issue chairs scattered around the building, a few personal lockers remained. These were about the size of the similar vertical lockers often found in school changing rooms, with a footprint area of barely one square foot, and contained a small area as a hanging rail and some tiny shelves for underwear, shirts, shoes etc.

There being little room for any personal possessions such as books, there would be very little entertainment or distractions to pass the time. The most one would have had might have been a few photographs of one’s friends and family left outside. The offices, however, all contained mirrors, so at least one could look smart, important perhaps for morale in a nuclear war.

Of course the rooms now are considerably barer than they would have been in use, but the mirror must still have done very little to alleviate the Spartan-ness of the painted brick walls, the strip lighting, the unchannelled wiring and the dark metal filing cabinets. Not to mention the continual lack of a window, or any natural light at all. There are of course the usual toilets and shower cubicles, probably not over-provided for a population of 200+ males and maybe a hundred females. There can't have been more than ten shower cubicles in total, for both sexes. Hopefully there was a good supply of Imodium, because any gastric illness would have spread like wildfire in such an environment.

Water would have been in short supply, yet essential for hygiene; in 2013 the WHO suggested a minimum of fifty litres per person per day for uses including clothes washing and sanitation as well as drinking, cooking and washing food, and personal hygiene, showering and hand washing.

They didn't have low water-use toilets in those days, so for 200 people for 28 days they would have needed a minimum of 500 cubic metres of water, that's a tank 10 x 10 x 5 metres, which seems larger than the actual tank they had.

There was no sign of any borehole to tap into uncontaminated supplies underground. This is also odd because Cambridge Water states that much of its water today comes from boreholes. There would be no subversive pilfering of loo rolls either; one roll survives in the bathroom area, its end clearly stamped 'Government Property'.



Kitchen boiler with pressure gauges and hot water outlet

The kitchen area had been moved from the 1953 bunker into the new building, into a much larger area to cater for many more people. Food would have been stored in the pantry where the shelves were labelled, not with actual food product names, but with order code numbers.

One can only wonder what foods 3800, 3805B, 3818 or A/CS 860 represented, or how stocks would have lasted, or been replenished. One lonely carton of milk (Express, semi-skimmed), long since dried out, complete with ancient desiccated mould, remains forlornly on the shelves next to the electric oven.

The larder seems quite small to have to store enough food for 200 people for 28 days, a total of 16,800 meals. In fact the stationery cupboard seemed larger. However the tea urns are large enough, and the old copper cylinder for boiling water is still present. Some of the kitchen equipment is illustrated.



On the left, an electric oven. On the right, kitchen cabinets with an abandoned milk carton (might be past its sell-by date though). The ashtray predates modern smoking restrictions

Another culinary feature notable by its absence here is any large chiller / refrigerator room. On 20 April it was pleasantly cool inside the RSG, maybe 10 to 15° C, when it was up to 25° C outside. The bunker would take several weeks to heat up and cool down again with the seasons. However with large numbers of people inside, along with electrical equipment, the ambient temperature would have risen, spoiling fresh foods quickly. However, cooking dry foods such as rice and pasta could have been problematical with a limited water supply. There were no doubt stand-alone fridges, but tea and dried biscuits must have been a dietary staple of the post-nuclear war scenario.

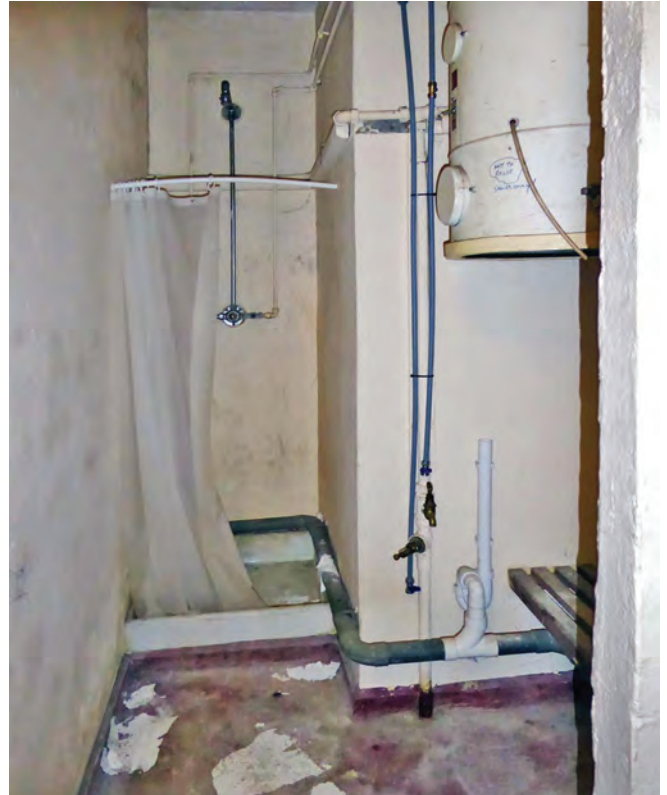
There were plenty of signs of the technology of the day still remaining, as much for protection from blast as for maintenance of life afterwards: blast doors, air conditioning, along with considerable amounts of telecommunication and other electronic equipment. Some pictures of this plant are shown below.

A surreal normality in nuclear war

There is often a strange comfort in maintaining a surreal semblance of normal routines in times of catastrophe. Anthony Beevor writes of how Berliners, in January 1945, still commuted to work in trams with shattered



The impressive-looking blast doors with secure catch. This was the entrance in use in the old building, just inside the dog-leg corridor (to minimise blast pressure). Photo Nick Catford



Decontamination shower rooms were basic and cramped; no attempt to put the piping near the floor in any convenient position either



Ventilation and filter chamber in the plant room in the original war room. Three or four hundred people need a lot of air, and a clean supply without radioactive fallout contamination was vital. Filtering and pumping it would require a lot of fuel for power. Photo Nick Catford

It's always good to be able to tell your children of what the planet looked like before the all-out nuclear war. Naturally there would be children of course, although there is far more space allocated to male dormitories than female ones, reflecting the gender mix of the departments concerned in the 1960s. Normal life would very soon be resumed one hopes, as testified by the government departments allocated space within the RSG.

windows (which the Germans kept running through the intensive Allied bombing) to turn up for work in the frigid windowless unheated shells of offices and factories where there was nothing to do because of a shortage of materials. At least some of the administrators who were fortunate enough (perhaps, unfortunate enough) to have a place in the RSG, rather than having to risk being fried outside, posted pictures as reminders of what the outside world (used to) look like. See also the Varsity link from the references. The reported picture of a squirrel was missing on our 20 April visit, but the RSG is not a rodent-friendly area anyway.



Standby diesel power plant in the original war room. Photo Nick Catford

Health and safety

There was as you would expect a sick bay on the first floor of the new building; disturbingly small, perhaps for a complement of three to four hundred people, who

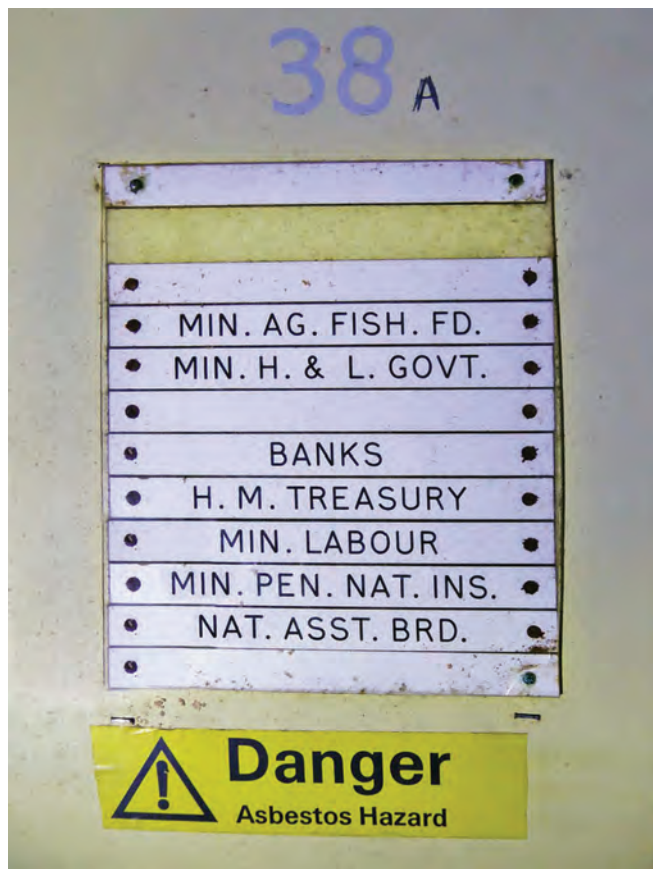
would also be suffering severe psychological stress and probably a poor diet, as well as lack of sunshine, exercise, and maybe some physical injuries if they were a bit late in reaching the RSG shelter.

Perhaps there would be some triage with the mildly sick still sleeping in the dormitories and the hopelessly ill just being abandoned. Also how would they have got outside to dispose of the dead?

Another intriguing small pair of rooms is the Commissioner of Justice and the Clerk of Court offices, just downstairs and across from the Sick Bay. There's not a lot of room for witnesses, judicial records, law precedents and the like. Also there's no obvious jail area.

Like the sick, would there be a sort of judicial triage, with minor offenders being cautioned or fined – well actually penalised in some other way, like being made to clean the toilets. Fines would have little significance once World War III broke out. Meanwhile would anything more serious result in one's being shot?

Other psychological comforts missing were that there was no library, so no light reading, no crosswords or Sudoku to pass the time when off-duty. In fact there would be very little sense of time passing, with no diurnal rhythm to go by, and there was no sign of fittings for clocks either. There might have been portable battery clocks – until the batteries ran out. Also there's no sign of a chapel.



Preservation of 'normal' governance functions, in a nuclear shelter. The Ministry of Pensions, in particular, might have been less than busy after World War III broke out. The 'Treasury' might have found tax collection difficult, too

There's an aphorism "There are no atheists in the trenches", meaning people's need for spiritual solace rises in times of crisis. Not in this bunker though. Likewise, no gym for exercise, and hopefully the recreation room would have had room for a snooker table or other leisure equipment. Almost every space, however, was functional, for running the region or for basic vital survival functions, eating, washing and sleeping.

Even more surreal is the collection of offices on the first floor of the newer building entitled National Assistance Board (unemployment benefits and care homes for the elderly and disabled), Ministry of Pensions, Board of Trade, and HM Treasury.

One wonders what sort of unemployment benefits would be available during and after a nuclear war, what the level of pensions would be, how much international trade would be going on, and what would the income tax rate be? There is even a 'General Post Office' room, evoking perhaps images of a determined stoic postie delivering mail through a nuclear wasteland, much like that iconic picture of a milkman doing his rounds in the London Blitz.

Back to normality

After an exploration of almost two hours we emerged back into the sunlight. To our relief, Cambridge was still there, and we were able to get some group photos of both visits.



Group visit 13 April. A special thanks to Steve Matthews (end of row on right) for organising both trips. Note the close proximity of the new housing. Photo Gerald Tompsett

Many thanks to Steve Matthews for facilitating our two tours which were enjoyed by all concerned. No doubt many appreciated what we saw there; the dark claustrophobic corridors and maze of rooms, the sinister atmosphere accentuated by the bare walls and in places they were even painted a dark shade of blue; hardly the most comforting hue for living within a huge concrete tomb whilst knowing that the world outside is being blasted to Armageddon.

But on reflection it may be that it is what is not there that is the scariest; no outside windows, no natural daylight.

None of the small everyday comforts we so often take for granted in the normal outside world.

Given the facilities that appeared largely absent from the bunker, in terms of physical recreation and spiritual comfort, it is hard to see how the occupants would have emerged in a healthy state, physical or psychological, to deal with the stressful job of reconstructing East Anglia and the world beyond after a nuclear war. Without the real-life run of using this bunker, which fortunately we have never had, these shortcomings would not have been apparent.

Probably some military psychologists would have been tasked with designing a better, more user-friendly bunker for World War IV, if anybody was left around to fight it, that is. However, perhaps as of now, all those who would become politicians of the world's major countries should have to spend a week in such a bunker, living as the residents of the Cambridge RSG would have done, with the same food and sleeping conditions, isolated in what could at any time have become a huge concrete tomb. Maybe the world would then become a safer place than it is now.

Cambridge's role as an RSG was to be very short lived. In 1965 the Labour government imitated a review of home defence which eventually led to the closure of the RSGs

in order to save money. Following a period of apparent disuse, a programme of refurbishment was started in 1990 to prepare the bunker as an Armed Forces Headquarters for No. 4 Region. This work was overtaken by the end of the Cold War and was never completed. When visited by members of Subterranea Britannica in 2001 evidence of this unfinished refurbishment was apparent throughout the bunker.

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Photos by the author unless otherwise stated

Practicalities of passing through canal tunnels

A guide to inland navigation (by both canals and rivers) in England and Wales, published in 1904, gives fascinating details of the practicalities of negotiating locks and tunnels. By 1904 the system included 45 tunnels over 100 yards long, of which ten were over 3,000 yards. The great majority had no towpaths through them, and were very narrow at the waterline (insufficient to allow two craft in transit to pass), so a system had to be devised whereby two could not meet head-on underground. Most craft even as late at 1904 were still hauled by horses, which could not operate without a towing path. It seems the horses walked over the hill to recommence haulage at the far portal, or were exchanged for fresh horses as had been the practice in stagecoach days (a sort of horse version of the Boris bike!). In the place of horses to pull boats through, the men or women on board had to push. There were two ways to do this, 'legging' and 'shafting'. Legging called for the crew to push against the tunnel ceiling or walls with their feet. For some long tunnels, professional 'leggers' could be hired to do this. In shafting, the crew used long poles to push instead of their legs. Some shorter tunnels were equipped with iron chains hanging along one side of the tunnel, and the crew pulled on these to attain forward motion. Exceptionally, a stop-lock could be operated at one end of the tunnel to accumulate a head of water sufficient when released to cause a current in the required direction, which at least helped.

To avoid two craft travelling in a tunnel in opposite directions, an alternating timed one-way system was operated. Clearly, somebody had to be stationed at each end to regulate admission. A few tunnels by 1904 may have had telephone lines between the persons at each end. SOURCE: DE SALIS, Henry Rodolph, 1904, *Bradshaw's canals and navigable rivers of England and Wales: a handbook of inland navigation for manufacturers, merchants, traders, and others, compiled after a personal survey of the whole of the waterways*. London: Henry Blacklock & Co. Ltd: ix + 450 + 8pp adverts [A facsimile reprint was published in 2012]



Two 'leggers' in the 500 yard Barnton Tunnel on the Trent and Mersey Canal in 1961



Peter Hay (1932 - 2018)

Ken Geddes

Peter Hay, mine explorer, railway photographer, author of at least a dozen books and long-term member of Subterranea Britannica, sadly died on 7 June 2018 from a heart attack. Peter was returning from a mining trip when he felt unwell and pulled into a service station near Telford. An ambulance was called and the initial diagnosis was favourable. However, Peter had a further massive major heart attack and died in hospital. He was 85.

His funeral was in the Cemetery Chapel at Hove. His family and a mixture of his friends from both the underground history world and mineralogists attended. One mourner was dressed in caving gear. Appropriately, Peter was buried with his caving helmet, a very appropriate symbol for his final underground trip. I was very touched to be asked to give the reading on behalf of Sub-Brit and the mining community as a whole.

Peter was born on 31 August 1932 in Brighton, and had a brother, now deceased, who lived in Canada. His father subsequently became Mayor of Brighton and Hove.

During the war, Peter was evacuated to Canada but returned to attend the local Grammar School, afterwards the London School of Economics. His National Service was spent with the Royal Navy, serving as a Supply Officer, achieving the rank of Lieutenant. He continued the connection by being in the Royal Naval Reserve, finally at the rank of Commander.

His real interest at the time was in railways, working as Station Master at Pevensey for a time but soon joining the Ministry of Transport in a key position. Every free moment was spent on steam photography, travelling during his National Service days by circuitous routes home on his free leave pass. He did what many others did not think of doing, he meticulously indexed every shot with details of when, where and why the picture was taken. This served him in good stead when he started to write copiously illustrated railway books, especially the "Steaming through..." series. These were all erudite entertainment, but with Peter, always full of oddities and his black-and-white photography was to a high standard. Much more serious was his biography of Brunel, highly praised at the time and a standard book of reference even today. For about ten years, he produced slightly more than a book a year. Unfortunately he had some seemingly minor dispute with his publishers, but it was enough to discourage him and he was already turning his interest to mining history and mineralogy.

By this time, he had long since left the Ministry and with it the constraints on following his interests. He supervised the

family electrical shop, a cornucopia of everything electrical, however obscure. He was physically very fit, walking several miles to work every morning and back in the evening.

Peter had another side: his family. This consisted of his wife Patricia (Paddy) and his four children, Fionnuala (Freddy), Lawrence, Daniel and Teresa (Terry). Paddy was as successful in her field of Nursing as Peter was in his. Sadly she died, too young, but her funeral was attended by an enormous crowd of friends and colleagues. It was a very emotional occasion indicating the love and respect in which Paddy and Peter were held.

In due course, Peter's human side was shown when he met Barbara, both at the time perhaps needing a shoulder to lean on. They remained close friends and at the "get-together" after the funeral, it was obvious that she was loved and part of Peter's family.

There are many memories of mining trips in North Wales, the Peak District and elsewhere. These were shared with Nick Catford, John Knowles, Daniel and many others. I



Peter Hay explores a flooded adit in the Dyfnigwn lead mine in mid-Wales in August 1987.

Photo Nick Catford

was walking alone on a high plateau in Wales one day when a figure appeared at a distance, also walking alone. It was Peter. Somehow it did not come as a surprise.

Ironically, Peter's claim to national fame was through a caving accident. One of my first mining trips with him was to Minllyn Quarry. I christened the flooded entrance adit a "Heineken Level" as the icy water reached those parts which other adits did not reach. At the far end of the main chamber was a mysterious slope, covered in apparently dressing fines. But from where? Peter said he would come back sometime and find out. He did come back in 2011 with Daniel. Unfortunately he slipped near the top and both he and Daniel fell, severely injuring an ankle and a foot. Somehow they struggled out and eventually the Air Ambulance made a heroic rescue from within the quarry under almost impossible conditions of high wind and darkness. Peter was interviewed at length from his hospital bed and featured extensively in the BBC's series "Helicopter Rescues". As always, Peter was full of chat and smiles.

With his death a page has turned in my life and for the many people who knew him. The world will not be quite the same.

